FACTORY

BETTER PRODUCTION AND MAINTENANCE THROUGH BETTER MANAGEMENT

Original watercolor: Sun shines bright on Lamson & Session's huge plant at Cleveland.

APRIL 1959

PRICE ONE DOLLAR

A McGRAW-HILL PUBLICATION

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What's good and bad—What's ahead—785-plant survey

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HOW YOU CAN GET THE BOSS'S EAR . . . . . p. 208

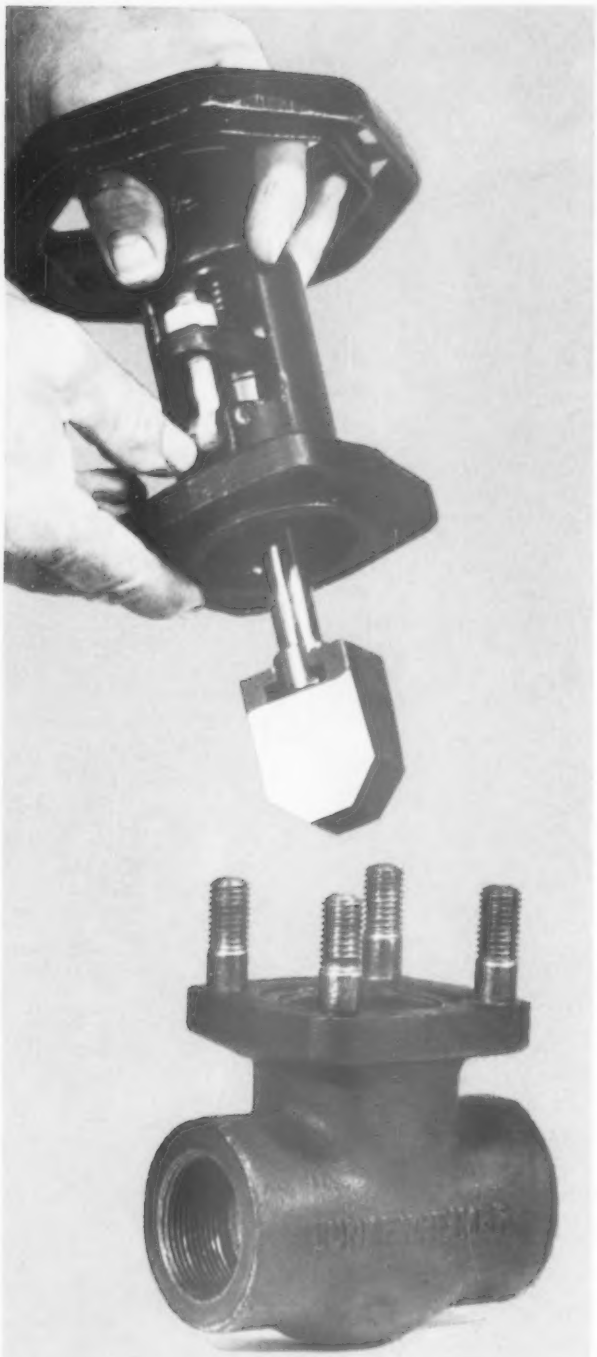

Fig. 8001 Screwed Ends. Sizes ½" to 2"
Fig. 8002 Socket Welding Ends

A New Lunkenheimer Valve

CHECK THE FEATURES OF THIS LUNKENHEIMER FORGED STEEL GATE VALVE

This new Lunkenheimer Forged Steel Gate Valve is already building a reputation for rugged service. Completely new in design, it's compactly built for fast installation in the most cramped quarters. Produced with famous Lunkenheimer materials and highly-skilled workmanship, it handles pressures of 800 lbs. at 850°F., and 2000 lbs. at 100°F. easily and safely. Discs are 13 Chrome Stainless Steel, heat treated completely through to 500 Brinell hardness to eliminate chipping or cracking. Rolled-in Seat Rings can't work loose. This newest addition to the world-famous Lunkenheimer line can help solve *your* valve maintenance problems. Call your Lunkenheimer Distributor, or write us for literature. The Lunkenheimer Company, Cincinnati 14, Ohio.

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LUNKENHEIMER QUALITY

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

For more facts circle 446 on READER SERVICE CARD

B.F.Goodrich

SUCCESS STORIES

B.F.Goodrich distributors helped these customers cut costs. Can they help you?

Rock 'n' roll

Getting tons of rock up a steep incline to the top of a building (see picture) was causing plenty of trouble at a Pennsylvania quarry. The angle is too sharp for a regular, smooth-surfaced conveyor belt. The rocks would have tumbled back down faster than the moving belt could carry them up. It looked for a time like the incline angle would have to be reduced—a longer, more expensive conveyor used.

But after discussing it with a B.F.Goodrich distributor, plant engineers decided to try a special kind of conveyor belt developed by B.F.Goodrich. This "Riffle Grip" belt, as it is called, is made with a series of extra-tough rubber ridges molded into the cover. The tread that these ridges form holds the rock in place.

This B.F.Goodrich belt was tried, and it works perfectly. It takes some 500 tons of rock an hour on the long, steep ride up to the crusher. There's been no slipping, no sliding, no problems of any kind.

Logging a record

At a Pennsylvania paper plant, big logs roll down a chute and crash onto a conveyor belt. They land edgewise, endwise, flat, any way they happen to tumble out of the debarking drum. Ordinary belts were often cut; the fabric soon weakened.

Then a B.F.Goodrich distributor recommended a B.F.Goodrich *cord* belt. That was four years ago. The belt lasted longer, carried more logs than any belt ever used before. Paper company officials were so pleased that the distributor recently sold them a second B.F.Goodrich cord belt exactly like the first.

Caution on curves

A coal mine in West Virginia has a big cone-shaped tank where coal is washed in water and sand. Carrying the sand and water to the tank are 42 lengths of B.F.Goodrich rubber hose. The chief engineer knew that if metal pipe were used it would wear through at bends and curves in no time. The B.F.Goodrich hose will last six or seven years—many times longer than pipe.

Clean haul

A manufacturer of laundry equipment designed a conveyor to carry wet clothing from a large hotel-type washing machine to an equally large clothes dryer. Several kinds of conveyor belts were tested on the unit, but the B.F.Goodrich "Griptite" belt was the only one that would carry the wet clothing up an incline and keep it from slipping back into the bin. This is the same B.F.Goodrich belt that's so successful at carrying all sorts of packages up and down steep inclines.

Feat of clay

A clay-products company in Mississippi was using an elevator belt to carry wet clay to dryers. The clay is so heavy that the buckets loaded with it kept working loose from the belt, lodging in the elevator framework, causing many hours of downtime. Belts lasted less than six months.

Then a B.F.Goodrich distributor sold the company a B.F.Goodrich elevator belt made with Nyfil fabric. Because this belt is so much stronger; buckets can't pull out any more; belt life is more than doubled, may be three or four times as long.

Customer not only made great savings in downtime and belt replacement costs; he actually paid less for the 7-ply Nyfil belt than he had been paying for 8-ply cotton belts.

Hurrying upstairs with a mountain of rocks—see "Rock 'n' roll"

New product

Abrasion-resisting sheet rubber. B.F.Goodrich "Armorline" is an adhesive-backed rubber sheeting material for lining chutes, launders, other equipment exposed to abrasion. Can also he used to patch worn places in rubber belting, sheeting, linings. Special cement furnished by B.F.Goodrich provides a tight bond. Application is easy; requires no expensive equipment.

New catalog

Link V belting. Catalog No. 1725 describes B.F.Goodrich link-type V belting, which can be joined by hand in any length needed. Belting can be installed in minutes without dismantling a drive. Sizes to fit all standard sheave grooves.

For more information

For full information about any product described on this page, see your B.F.Goodrich distributor or write *B.F.Goodrich Industrial Products Co., Dept. M-563, Akron 18, Ohio.*

B.F.Goodrich
industrial rubber products

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THE MAGAZINE OF PLANT OPERATING MANAGEMENT

Edited exclusively for the men with management responsibility for production and maintenance in the manufacturing industries

PROBLEM-SOLVING GUIDE

THIS SIMPLE FILING SYSTEM is designed to give quick access to past FACTORY articles that can help you solve current operating problems. Here's how it works:

1. All major articles and many short items are classified according to a functional code system (below). Codes cover basic operating responsibilities.

2. Where applicable, articles are also coded (see numbers in parentheses) to show secondary or closely related topics.

3. To use, cut up the items below. Paste them on 3x5-in. cards and file by code number. To cross-index, copy the information on a second card, and file by secondary code.

For ways to use this tool, plus an outline for a complete decimal filing system (DFS), circle DFS in upper right corner of Reader Service Card, next to back cover.

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1.1 Management and Practices	2.1 Management	3.1 Organization and Policies
1.2 Buildings and Yards	2.2 Production Controls and Systems	3.2 Personnel Development
1.3 Services and Facilities	2.3 Methods and Technology	3.3 Employee Relations
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ELPAR Clamp Trucks Double Warehouse Capacity

Iron Out Seasonal Production Troubles

● Two versatile ELPAR electric clamp trucks solved a warehousing problem at the Donora, Pa. Works of U. S. Steel's American Steel and Wire Division.

The seasonal demand for fence and welded reinforcing wire fabric necessitated additional storage space to accommodate material produced during the winter to meet normal spring and summer orders.

ELPAR engineers were asked to develop this versatile fork truck attachment which handles a wide variety of shapes and sizes of welded wire fabric and makes possible ceiling high stacking of coils.

Result — storage space was doubled and peak demands are met by off season production.

This is a typical example of how ELPAR trucks, backed-up with the experience of ELPAR's engineering staff can solve tough handling problems. You not only save through more efficient handling . . . you save on operating costs too.

You will be well repaid if you investigate the quality line of ELPAR electric powered industrial trucks.

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THE **ELWELL-PARKER** ELECTRIC COMPANY
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TWICE THE LIFE . . . ONE-THIRD THE OPERATING COST

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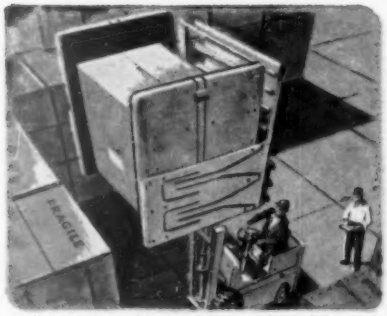
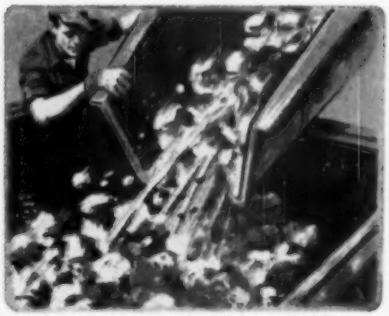
WHAT NEW USE FOR RUBBER DO YOU SEE HERE ?



It helps fork-lift trucks keep a grip on things.

It keeps tumbling barrels tumbling far longer.

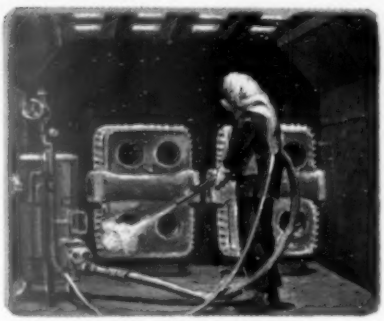


It armors stone-crusher chutes against the constant, abrasive crush.

It makes rugged iron ore shaker screens that stand up under the constant shakes.

It chutes newly mined ore down a 13,000-foot mountain.

It prevents the escape of materials — or fumes — from conveyors.



It keeps the walls of shot-blast rooms from being shot up.

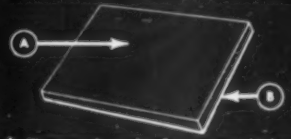
It guards the doors in factories and plants against abuse.

GOODYEAR INDUSTRIAL PRODUCTS

GTM-Specified

ARMADILLO CHUTE LINING

to resist abrasion and mild corrosion



A Tire-tread stock of extreme thickness resists abrasion, corrosion and impact

B Fabric backing of one or two plies available. Can also be vulcanized to metal backing, when required

And these are only a few of the ever-increasing uses for super-tough ARMADILLO and steel-backed ARMAPLATE rubber sheeting. The G.T.M.—Goodyear Technical Man—recommends them as incomparable abrasion-fighters. For they refuse to cut, tear, gouge or dent. They shrug off the attacks of acid, corrosion and heat. In fact, they've been known to *outlast heavy steel 12 to 1.*

How can you use these phenomenal materials? Their application is almost limitless — for they're available in a wide variety of sizes and thicknesses. They're easily fabricated. ARMAPLATE, for example, can be sawed, sheared, rolled, bent, punched, bolted. For the rest of the story, contact the G.T.M. through your Goodyear Distributor — or by writing Goodyear, Industrial Products Division, Akron 16, Ohio.

It's smart to do business *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

ARMADILLO and ARMAPLATE by

GOODYEAR

Armadillo, Armaplate—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

THE GREATEST NAME IN RUBBER

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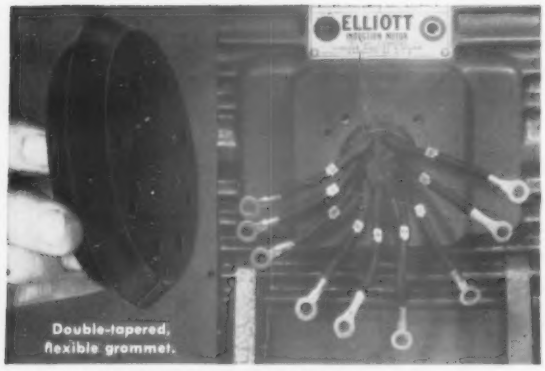
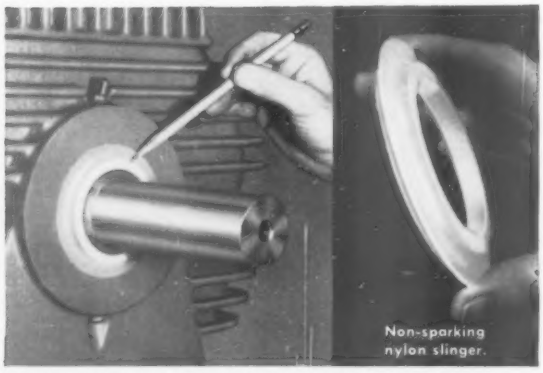
better protection and better cooling make Elliott C-W SEALEDPOWER MOTORS outstandingly



TIGHTLY COMPRESSED GROMMET seals leads where they leave motor frame. Grommet is compressed around numbered leads by pressure ring. No leakage here.



ROTATING SLINGER BANISHES MOISTURE, DIRT that otherwise might creep along shaft and through bearing. Recessed into bracket, it provides long labyrinth-type seal.

IMPORTANT FACTS
about enclosed motors are given in new Elliott Bulletin PB-6000-2. Send for free copy today.

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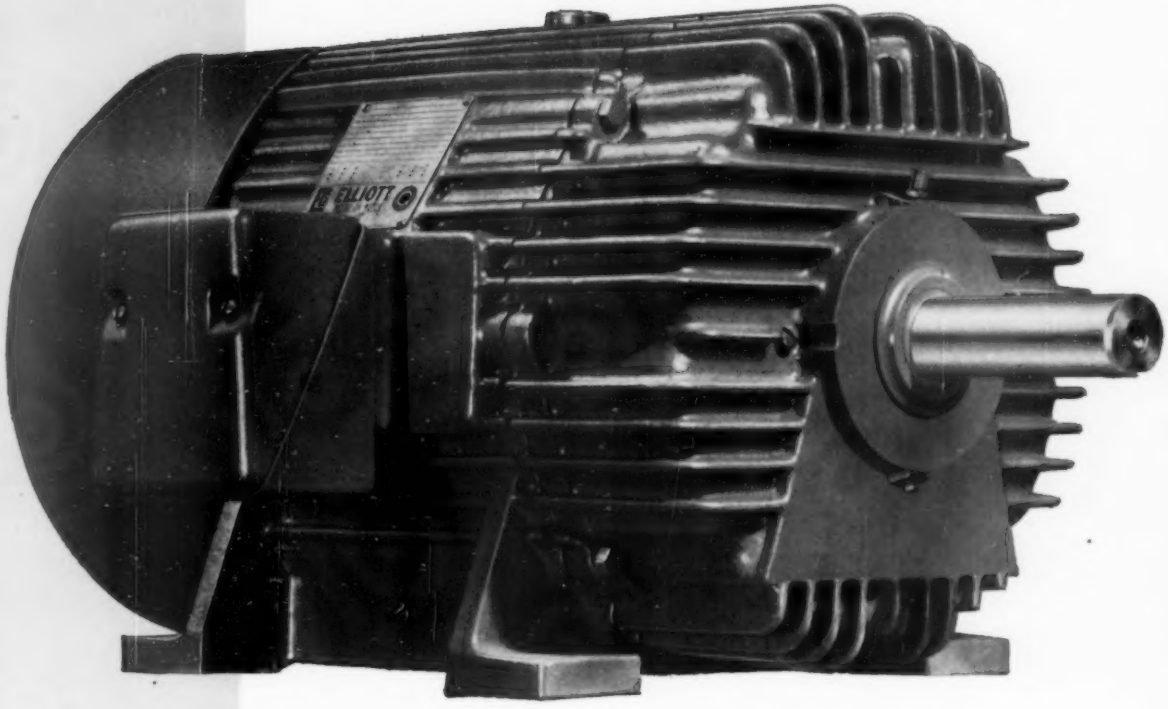
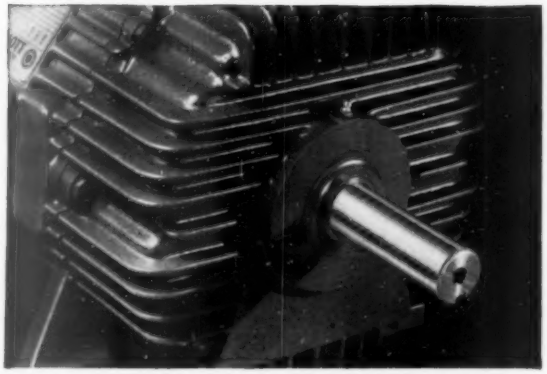
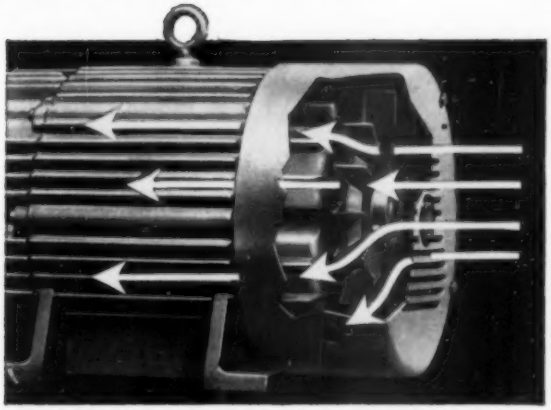
Elliott C-W ribbed-frame enclosed motors, pioneered in the United States by Crocker-Wheeler, include ratings up to 300 hp.



dependable!



MORE AND DEEPER HEAT-RADIATING FINS have greater cooling area. Generous fins over rear bracket keep bearing cool. Non-clogging, easy to clean.



COOLING AIR BLAST FROM EXTERNAL FAN, directed by fan cowl, hugs entire length of motor. Non-sparking fan has keyed and clamped split hub.

ELLIOTT Company

CROCKER-WHEELER PLANT • JEANNETTE, PA.

W9-1

One **RUGGED** Swivel Construction * for a whole range of **CASTER DESIGNS**

. . . assures dependable, low-cost materials handling

The 900 Series Caster and its variations—featuring *2 full rows of ball bearings* rolling in *2 separate, hardened enclosed raceways*, for easy swiveling, heavy gauge steel horn and top plate for extra strength—are examples of the variety and scope of the Faultless line. Whatever *your* material handling problem—Faultless, the "Complete Line" backed by nearly three-quarters of a century of caster-making experience, assures you the Caster to best do your job.

Faultless 900 Medium-Heavy Duty Caster

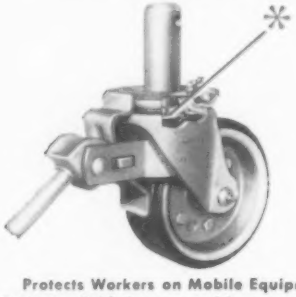
The 900 Series is a rugged, all-purpose Caster with Double Ball Bearing Swivel that out-performs the ordinary kind. Full drawn steel horn formed for surplus strength. Complete selection of wheels to suit floor surfaces, loads and operating conditions make it the ideal choice for use wherever high quality Industrial Casters are needed for medium-heavy duty applications.

Faultless 900GS Caster with Triple Grease Sealed Bearings

Dirt Can't Hurt It!

900GS combines dependable Faultless Double Ball Bearing Swivel construction with triple grease seals to give positive protection to swivel and wheel bearings wherever dirt, steam, chemicals are encountered—minimizes "down-time." Choice of hard and cushion tread wheels in sizes and capacities from 240 to 650 lbs. per caster.

Faultless C900 Scaffold Caster with Double Safety Locks



Protects Workers on Mobile Equipment

C900 Scaffold Caster combines an easy-to-use foot-operated brake lever which simultaneously locks both swivel and wheel and famous Faultless Double Ball Bearing Swivel construction—assuring safe and positive handling of mobile equipment holding workmen—making it the ideal caster for industrial, military and construction equipment.

WRITE FOR FREE LITERATURE

ASK YOUR DISTRIBUTOR Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. He and one of the strategically located Faultless Sales Engineers are available to work with you on every handling problem in your plant. Both are listed in the phone book Yellow Pages, under "Casters," and the Faultless heading.

Faultless Caster Corporation
Evansville 7, Indiana

Please send information on the following casters:

☐ 900 Series ☐ 900GS Grease Sealed ☐ C900 Scaffold

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

FACTORY LETTERS

WHICH FIGURE'S RIGHT?

Sir:

I question the statement in your January issue (Looking Ahead in Business, page 35). You say "Family formation will decline temporarily over the next few years. This will hit housing."

This is contrary to all information we are able to obtain. In fact, population is predicted to remain on the upswing; naturally this will also reflect on family formations. Could you be in error or are we receiving incorrect information?

Ernest R. Linebaugh
Production Manager
Eastern Division
Inland Homes Corp., Hanover, Pa.

► Both your statement and ours about predicted increases in population are correct. In our statement, age by group is the key factor to the formation of family units. In the next few years, the number of American males entering the 25- to 44-year-old group will be limited. And since this is considered the family formation age range, the formation of families will naturally decline. You'll note we've qualified this statement with "in the next few years" because the situation is expected to change drastically after 1965. Then there will be a major increase of males in the family formation age group. Hope this clears up your question.—ED

Turn the page

FACTORY

April 1959 Vol. 117, No. 4

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Load and unload in seconds!

When massive loads must be moved through congested yards . . . between branch plants . . . or to customers *miles* away . . . nothing does it as profitably as a *Gerlinger Material Carrier.* Your products are loaded, delivered and unloaded by one man without double handling . . . *in one quick, cost-saving trip!*

Want to see new material handling facts and figures reported by Gerlinger users? Ask for *Certified Job Studies On Carriers*—and new Gerlinger Specification Folder *GMC.* Write to Towmotor Corporation, Cleveland 10, Ohio or Gerlinger Carrier Co., Dallas, Oregon.*

COME SEE US AT . . . THE MATERIAL HANDLING INSTITUTE'S EXPOSITION
CLEVELAND AUDITORIUM — JUNE 9-12 1959
BOOTHS 1302-1307-1404

TOWMOTOR THE ONE-MAN-GANG ® **-GERLINGER** * LEADERS FOR 40 YEARS IN BUILDING FORK LIFT TRUCKS, CARRIERS AND TRACTORS

*Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

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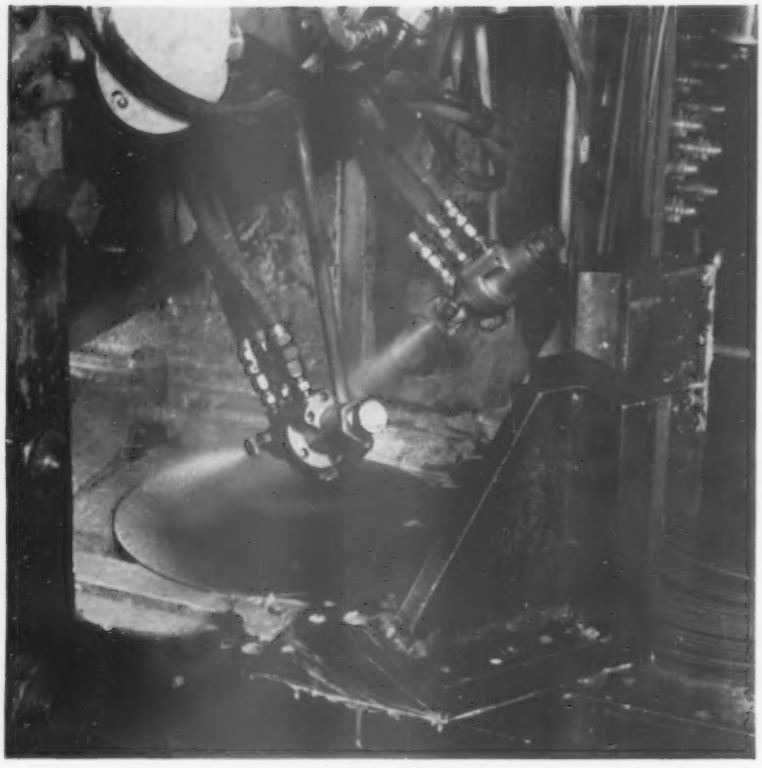

SPRAY LUBRICATION SPEEDS PRESS-ROOM PRODUCTION

... saves material, protects dies, reduces rejects

By comparison, any methods of lubricating dies other than spray are haphazard and inefficient. Versatile DeVilbiss WDB automatic guns, that handle all types of compounds, eliminate the waste of manual methods . . . have actually cut die-lube costs as much as 50% in many stamping and forming operations.

By applying a measured amount of lubricant exactly where it's needed . . . *automatically* . . . the DeVilbiss system frees men for productive work, slashes press-maintenance costs, literally eliminates scrap caused by improper lubrications. Compound is delivered from a pressure tank, through hose, in a closed system.

If your manufacturing process involves the application of compounds, lubricants, adhesives, paints, or coatings it will pay you to investigate DeVilbiss automatic spray. Call our nearest representative for full details, or write us direct.

THE DEVILBISS COMPANY
TOLEDO 1, OHIO
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BRANCH OFFICES IN PRINCIPAL CITIES

FOR BETTER SERVICE, BUY
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FACTORY / LETTERS

Begins on page 8

MORE ON MODERNIZATION

Sir:

I was pleased to receive your report on control of modernization (November 1958). I particularly liked the reference to the five major methods of calculating rate of return on investment (page 90). I believe one of the most difficult jobs is to present for final approval a concrete analysis of the need for new equipment. Of course, your article "How You Can Sell Modernization Ideas Up the Line" (page 100) ties in with this, too.

W. C. Keeran
Vice President
Vapor Heating Corp., Chicago 48

Sir:

A copy of your "Managed Modernization" issue (November 1958) has just reached me. I feel you have every right to be proud of the final result. We are tremendously pleased to have had a hand in the "creation" of FACTORY's "Guide to Managed Modernization." Please send us 25 additional copies.

John R. McCord
Director-Marketing
Ferro Corp., Cleveland 5

► Thanks for the bouquets. Incidentally, FACTORY's editors received special recognition in a friendly competition among all McGraw-Hill publications for their efforts on managed modernization.—ED.

THE SAVING'S IN LABOR

Sir:

In your January issue the article "Better Ideas—Better Methods" showed an ink tube packed in a molded styrofoam block (page 69). I'd appreciate knowing how $4400 was saved by the use of styrofoam. It would seem that this styrofoam part would be much more expensive than sawdust and chipboard boxes. Is the saving due to reduced labor?

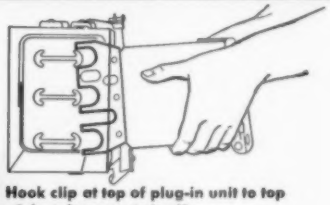
S. A. Czarnecki
Worcester Moulded Plastics Co.
Worcester 8, Mass.

► As you surmised, the saving does not come from the styrofoam package itself but from the labor involved. The styrofoam package actually costs

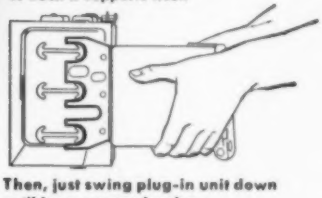
Another Reason for Using Square D Aluminum Plug-in Duct...

SQUARE D PLUG-IN UNITS GIVE YOU EXCLUSIVE *hook-swing* MOUNTING

Safer, Faster, Easier Mounting



Hook clip at top of plug-in unit to top of duct. It supports itself



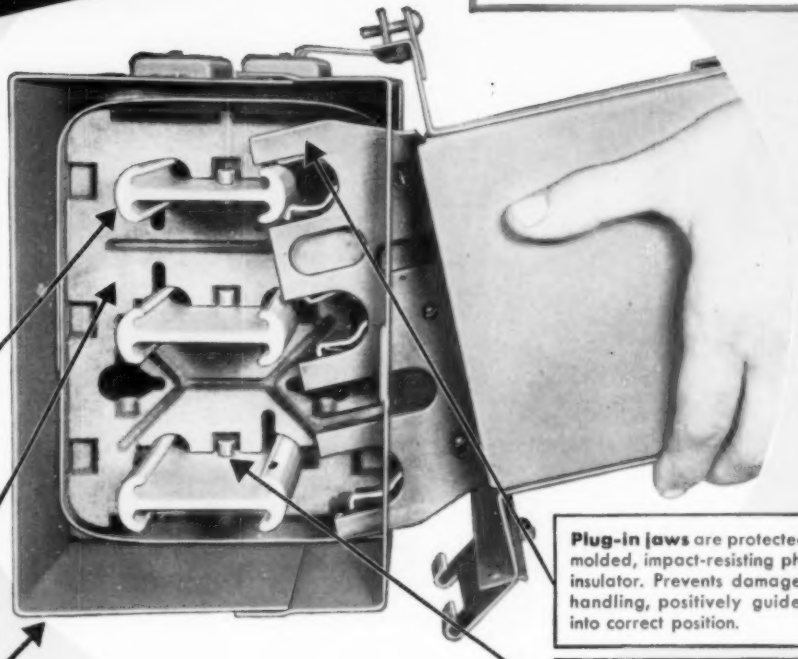
Then, just swing plug-in unit down until jaws engage bus bars

Hanger mounting (*not shown*) makes installation easy. A universal hanger permits mounting in *any* position. Just suspend and level top portion of hanger, then clip on lower portion. U.L. approved for 10-foot spacing.

I-beam construction of bus bars—a Square D exclusive—provides four times the strength of conventional bus bars. Bars are zinc, copper and silver-plated full length.

Full width bus support provides greater strength on short circuits, freedom from vibration. Also acts as fire stop where duct passes through walls and floors.

Square D duct is totally enclosed for maximum safety—no danger of accidental shorts. Prevents overheating from dust accumulation.



Plug-in jaws are protected by a molded, impact-resisting phenolic insulator. Prevents damage from handling, positively guides unit into correct position.

Steel pins in each bus bar prevent bars from shifting and support them on vertical riser installations.

With other plug-in duct, it's no easy job to mount the plug-in units. In fact, it takes a lot of real pushing which is neither safe nor easy when you're working on a ladder. With Square D's exclusive *hook-swing* mounting, you just hook the plug-in unit to the top of the duct. Then, simply swing it down and in until the jaws have engaged the bus bars. No awkward pushing required—no unnecessary chances to take.

Square D aluminum plug-in duct with exclusive *hook-swing* mounting costs no more—why settle for less?

Write for Bulletin SD-110. It gives the facts on Square D aluminum plug-in duct. Address Square D Company, 6060 Rivard Street, Dept. SA, Detroit 11, Michigan

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

SOLID POWER

of a Remington drill

Chips fly when Remington power tools bite into steel. They're tough to wear out, too, because of the solid way Remington builds them. Remington manufactures a broad and versatile line. In drills alone, choose from 21 electric-powered or 11 air-powered models. Each is serviced for parts or repairs from a nationwide network of Remington Service Stations. It makes sense any way you look at it to specify Remington for all your portable power tool needs. Mail coupon for free descriptive catalogs—there's no obligation.

CHOOSE THE POWER MOST EFFICIENT FOR YOU. REMINGTON POWER TOOLS ARE AVAILABLE IN **AIR • ELECTRIC • GASOLINE AND POWDER-ACTUATED MODELS**

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Please send—without obligation—catalogs on Remington Contractor & Industrial Tools checked below:

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*Company*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

For more facts Circle 456 on Reader Service Card

three cents more than the package formerly used. But the change in packaging methods enabled Markem Machine Company to save on labor costs in two places. First, the ink tubes can be put into the molded blocks much faster by production packers. And second, since the styrofoam package is much more sturdy, less time is required to prepare it for mailing in the shipping department.—ED.

GOOD 12 YEARS LATER

Sir:

We've read with a great deal of interest your "Manual of Work Simplification" published in 1947. You are to be complimented on an excellent collection of articles selected for this manual from regular issues of FACTORY. Can you recommend other similar publications on this subject?

J. E. Graver
Investigation & Development Dept.
Canada Packers Ltd.
St. Boniface, Manitoba

Sir:

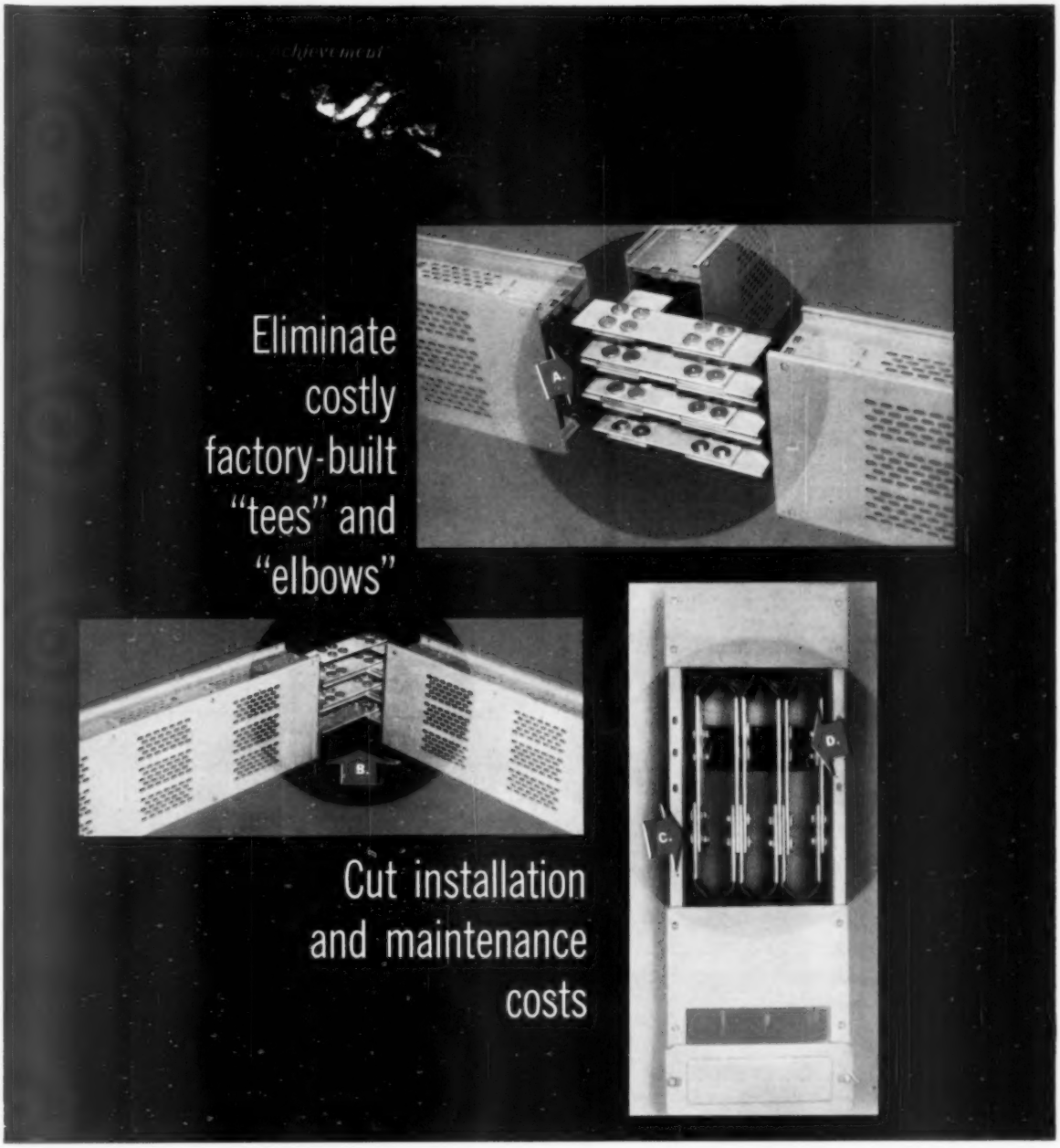
I've just read with interest an article in your 1947 "Manual of Work Simplification" entitled "How to Figure Learning Time." Is there any additional material published on this subject since that time?

W. G. Flaherty
Wentworth Institute
Boston, Mass.

► Since publication of our "Manual of Work Simplification" in 1947 we have published many short articles on work simplification. And in July 1958 we did another major report on the subject (with the cooperation of such well-known experts in this field as Allan H. Mogensen, Lillian M. Gilbreth, Erwin H. Schell, David B. Porter, and Herbert F. Goodwin).

However, we regret to say we have nothing newer on the specific subject of learning curves. To our knowledge, the aircraft companies are the only ones that seem to be using learning curves to any extent at the present time.

Our editors are extremely pleased to discover that this Manual published some 12 years ago is still in



FEDERAL PACIFIC'S NEW LOW IMPEDANCE BUS DUCT features a unique splicing system which permits "tees" and "elbows" to be built up on the job site using standard bus duct sections—thus eliminating costly factory-built fittings. Result: substantially lower initial cost, no delivery delays, greater flexibility and higher salvage value. Splicing system has fewer joints. Result: faster installation and less maintenance. Available in both Feeder and Plug-in types. For complete, detailed information, write for Bulletin 3-125: Federal Pacific Electric Company, General Offices: Dept. 304, Newark 1, New Jersey.

A. "TEE" MADE FROM THREE STANDARD SECTIONS—can be either forward or rearward. Only two splices instead of three on factory-built units.

B. "ELBOW" MADE FROM TWO STANDARD SECTIONS—can be either forward or rearward. Only one splice instead of two on factory-built units.

C. FEWER JOINTS PER BUS BAR—straight lengths require four instead of six joints. On larger duct only seven joints are required instead of twelve.

D. PROVISION FOR CURRENT TAKE-OFF DEVICES—A spare set of holes is provided at each splice to accommodate future additions of current take-off devices.

FPE

FEDERAL PACIFIC ELECTRIC COMPANY

The Best in Electrical Distribution and Control Equipment

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Dust Control is a job for Engineers

The "rule of thumb" methods of the inexperienced, or the "engineering rules" of an experienced design, fabrication, and installation firm—which will you select for your dust control problems?

Kirk and Blum offers you...

ENGINEERING—a staff of qualified engineers with proven ability to solve your dust control problems.

RESEARCH—continuous research on full scale equipment, to develop the most efficient systems.

EXPERIENCE—over 50 years of dust control service.

Every Kirk & Blum installation is based on a complete service: Design — Fabrication — Installation, backed by K & B's acceptance of One Undivided Responsibility for the system to assure your satisfaction.

On your dust control problem consult Kirk and Blum, craftsmen in dust control, where fine craftsmanship is appreciated. The Kirk & Blum Manufacturing Company, 3209 Forrer St., Cincinnati 9, Ohio.

KIRK & BLUM DUST CONTROL SYSTEMS

FACTORY / LETTERS

Begins on page 8

use as source material. This is a particularly interesting fact when you consider publication of the "Manual for Work Simplification" was discontinued in 1950.—ED.

IT'S HOMEMADE!

Sir:

On page 83 of the January 1959 issue of FACTORY we noted the article about the use of a pegboard as a means of scheduling work in a machine shop at Texas Instrument Co. We would like to know if this piece of equipment can be purchased complete with tags.

W. F. Flint
Plant Superintendent
Ritepoint Division
Amron Corp.
Waukesha, Wis.

► The pegboard used at the Apparatus Division of Texas Instrument is homemade. One of their engineers designed it to specific needs and requirements. Hope you can do the same from the descriptive material in our article.—ED.

INFORMATION WANTED

Sir:

We're interested in setting up a control system for maintenance of our factory machinery. Have you information or suggestions about courses or literature regarding setting up and keeping maintenance records on such items as lubrication, checking of machine parts, routine inspection of air conditioning equipment, boilers, etc.

Miguel Aponte Vega
Personnel Director
Gordonshire Knitting Mills, Inc.
Cayey, Puerto Rico

► The important thing in setting up any satisfactory program is to learn the basic principles of maintenance management. For your guidance, we're sending you a list of reprints. Please refer to those listed under "Maintenance and Plant Engineering." The six items marked should be a good start for planning your program. You may order any of these direct from our Reader Service Department.—ED.

For more facts Circle 458 on Reader Service Card

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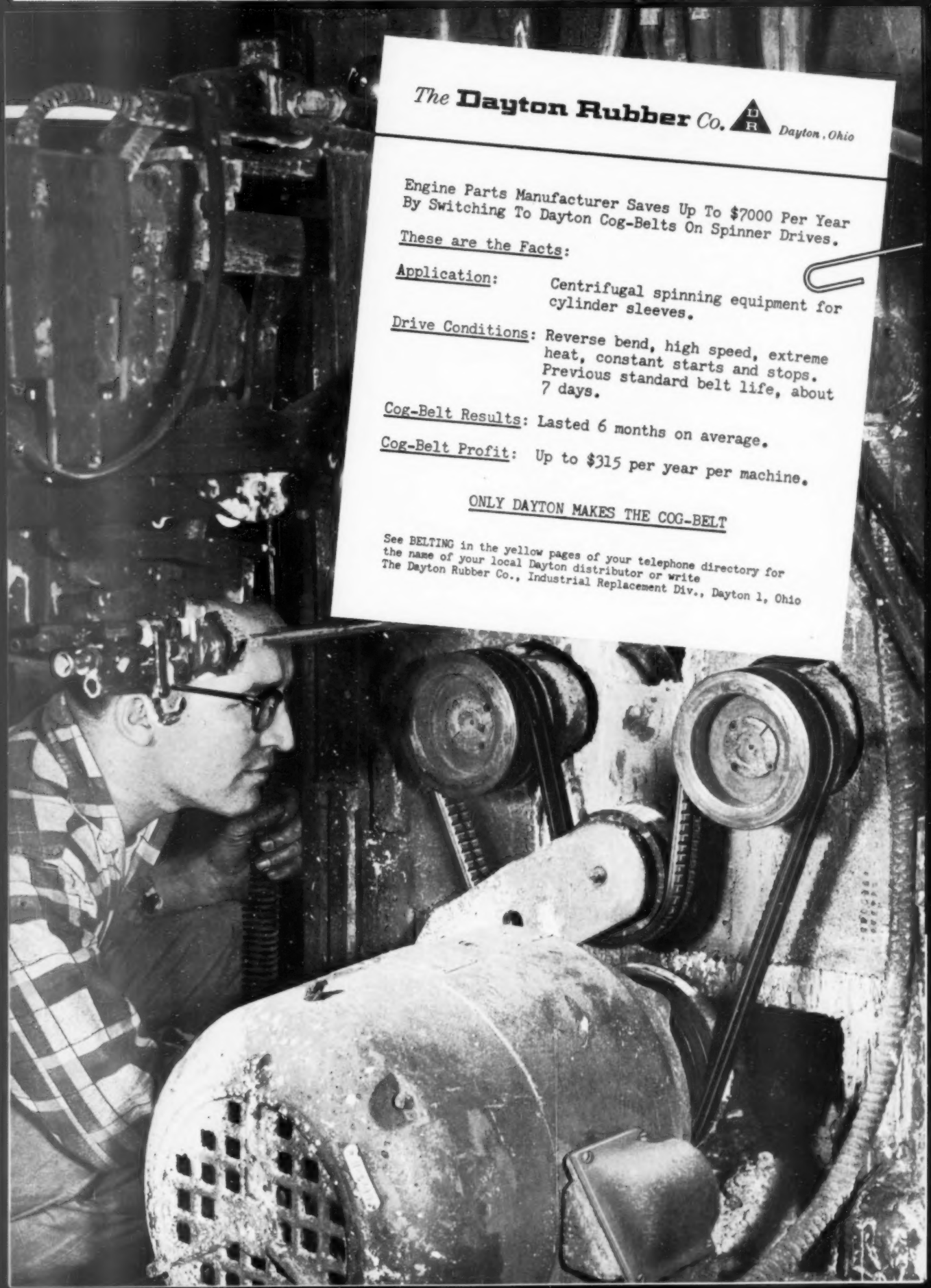


The **Dayton Rubber** *Co.* D R *Dayton, Ohio*

Engine Parts Manufacturer Saves Up To $7000 Per Year By Switching To Dayton Cog-Belts On Spinner Drives.

These are the Facts:

Application: Centrifugal spinning equipment for cylinder sleeves.

Drive Conditions: Reverse bend, high speed, extreme heat, constant starts and stops. Previous standard belt life, about 7 days.

Cog-Belt Results: Lasted 6 months on average.

Cog-Belt Profit: Up to $315 per year per machine.

ONLY DAYTON MAKES THE COG-BELT

See BELTING in the yellow pages of your telephone directory for the name of your local Dayton distributor or write The Dayton Rubber Co., Industrial Replacement Div., Dayton 1, Ohio

Now is the time...

TO STOP COSTLY ROOFING TROUBLES

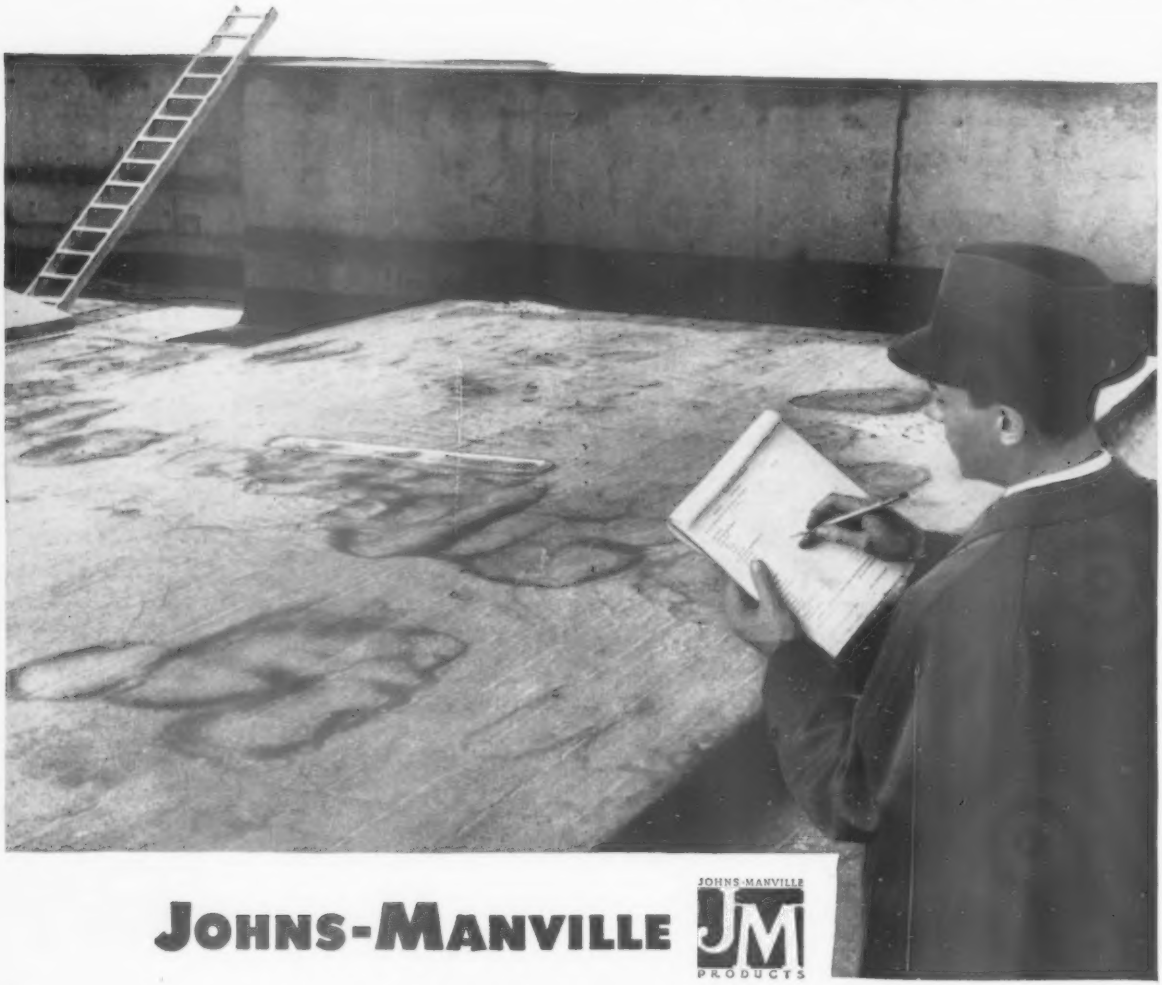
Johns-Manville Roof Survey helps protect your buildings

• You can forestall roof defects that may result in costly damage by having your built-up roof inspected by an expert. And your J-M Roofing Contractor is the man to do it.

Using the Johns-Manville Roof Survey Plan, he will give you an accurate picture of all the critical areas of your roof. This detailed report covers the conditions of flashings, deck, roofing felts, parapet walls, skylights, ventilators . . . everything on your roof that has a bearing on its ability to keep out the weather. It will enable you to make plans now for repairs and maintenance in the future.

To take advantage of this free roof survey, just call your J-M Roofing Contractor. He is listed in the Classified Telephone Directory.

In the meantime, let us send you a copy of the information packed booklet "Things You Should Know About Your Roof." It contains the full story about the J-M Roof Survey Plan. Write to: Johns-Manville, Box 158, New York 16, N. Y. In Canada, write Port Credit, Ontario.



JOHNS-MANVILLE JOHNS-MANVILLE JM PRODUCTS

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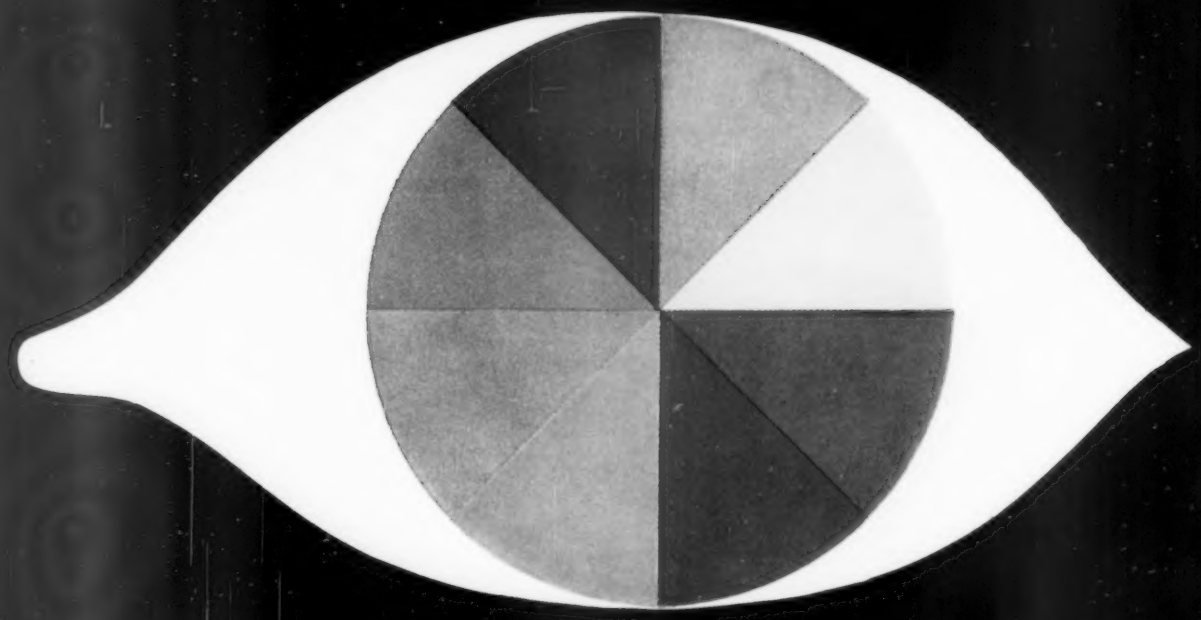

THESE COLORS CAN CUT YOUR ABSENTEE RATE

Maintenance paints can return a profit two ways. First, by assuring long-lasting good appearance, as Du Pont Paints do. Real economy begins where "bargain" paints fail.

The second way is by reducing absenteeism, boosting efficiency, promoting safety. It's a thoroughly documented fact that *color*, scientifically used, can make employees happier, safer and more productive. Du Pont puts these principles of color to work for you in its system of Color Conditioning.

A complete plan of Color Conditioning for your plant or office is yours for the asking. Also expert technical help on any special paint problem. So is the 28-page booklet, "How to Put Color to Work." Write: E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. FM-94, Wilmington 98, Delaware.

DU PONT

Better Things for Better Living
. . . through Chemistry

DU PONT COLOR CONDITIONING PAINTS

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Look Inside YORK'S Revolutionary 3-Pipe System with Hi-I Induction Conditioners

See How It Simplifies Building Design...Cuts Primary Air Needs up to 30%... Requires No Air or Water Zoning

Based on YORK's new Hi-I induction conditioner, with greatly increased secondary coil capacities, this new air conditioning system can be designed for 30% less primary air than conventional systems. As a result, it may be sized for smaller primary air equipment, lower central fan horsepower, and smaller primary air ductwork. Reduces space requirements, installation and operating costs, and simplifies layout.

Zoning of ventilating air or supply water is no longer a problem. Constant quantities are delivered uninterruptedly to all points.

Avoids Power and Steam Cost Penalties

With the 3-pipe system, units are supplied with hot and cold water simultaneously as required during the year. Room temperatures are regulated by means of non-mixing automatic unit control valves. This completely eliminates summer-winter changeover and nighttime shutdown...offers dramatic savings in power and steam costs.

Added economies in central station equipment can be obtained by use of a YORK Air-Source Heat Pump or Lithium-Bromide Absorption System.

50% Greater Personal Comfort

YORK's new 3-pipe system with Hi-I induction conditioners makes possible a new concept in air conditioning. Built-in hot and cold water supply lines, with automatic unit control valve; provide instant response to temperature requirements of room occupants...permit 50% wider temperature variation from room-to-room. Quiet operation assured by YORK patented primary air nozzles.

YORK

YORK CORP. SUBSIDIARY OF BORG-WARNER CORP.

BORG-WARNER
RESEARCH & ENGINEERING
MAKE IT BETTER

Air Conditioning, Heating, Refrigeration and Ice Equipment • Products for Home, Commercial and Industrial Installations

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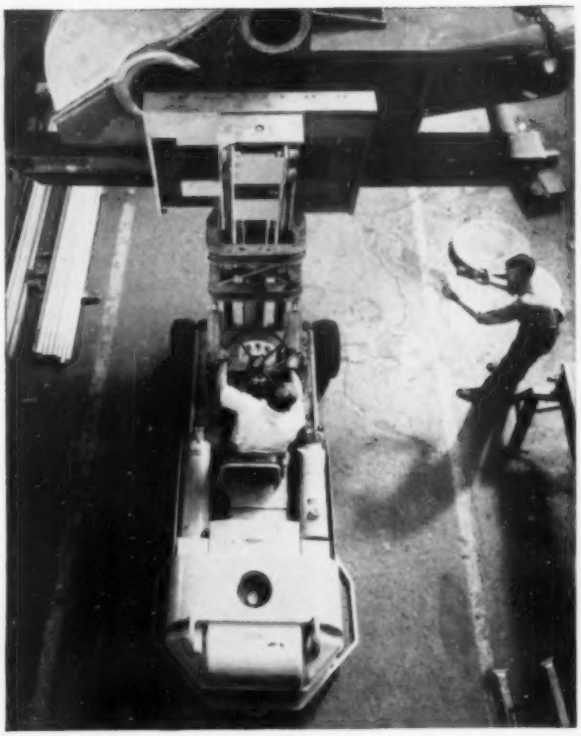
B.F.Goodrich

Pneumatic

B.F.Goodrich makes a complete range of sizes and variety of tread designs, including the new All-Purpose.



Solid

Which is right for you—Pressed-On Solid in regular or Deluxe Cushion, or Vulcanized-On Solid! What tread design! What compound?

Your B.F.Goodrich TIRE AND WHEEL Analysis man gives you industrial tire advice . . . FREE!

Problem: There are many variables in industrial tire types, sizes, tread compounds and tread designs. Do you know which tire is right for your materials handling job?

Solution: Without cost or obligation your B.F.Goodrich Tire and Wheel Analysis man will study your equipment, loads, hauling surfaces and other special problems you have. He'll recommend the right tires for you to use—recommendations that are unbiased because B.F.Goodrich makes a *complete* line of industrial tires.

Result: You save as much as 50% on industrial tire costs, as much as 20% on maintenance costs! Mail the coupon today for your FREE B.F.Goodrich TW Analysis.

A special consulting service is available to manufacturers of materials handling equipment.

Specify B.F.Goodrich tires when ordering new equipment

B.F.Goodrich Tire Company
A Division of The B.F.Goodrich Company
Department TW-753, Akron 18, Ohio

I would like further information on your FREE TW Analysis.

NAME_____

COMPANY_____

STREET_____

CITY_____ STATE_____ ZONE_____

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B.F.Goodrich *industrial tires*

Win a Thunderbird or Corvette in the B.F.Goodrich Truck Tire Mileage Contest. See your B.F.Goodrich dealer for entry blanks.

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Gulf makes things run better, with—

NEW GULFCROWN

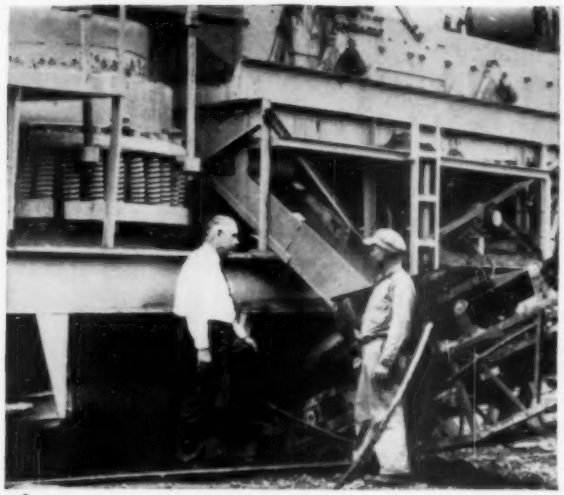
Here's a multi-purpose lithium base grease for bearings in heavy duty service.

It's a completely new bearing grease that effectively lubricates bearings operating under high loads, shock loads and with oscillating motion.

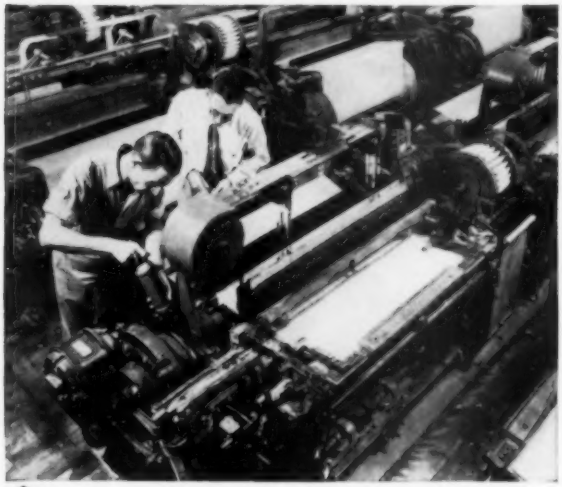
New Gulfcrown Grease E.P. will give you plenty of proof that Gulf makes things run better. It resists heat, cold, moisture and mechanical breakdown. It has excellent oxidation stability and protects against corrosion.

You'll find that this new grease pumps freely at 0°, yet stands up at temperatures to 250° F., and even higher under certain conditions.

New Gulfcrown E.P. is an unusually versatile multi-purpose grease. For example, it gives excellent results in the lubrication of heavily loaded trunnion bearings . . . steel mill work rolls and table rolls . . . sliding dog clutches . . . spiral gear boxes . . . Banbury mixers . . . the bearings, cams and gears in textile looms . . . and



In hard-working equipment, like stone crushers, new Gulfcrown Grease E.P. withstands extremely high shock loads in grease lubricated bearings.



In textile mills, the excellent residual anti-weld properties of new Gulfcrown Grease E.P. makes it the ideal lubricant for loom bearings, cams, pick balls and gears.

In steel mills, new Gulfcrown Grease E.P. will successfully withstand the high temperatures and extreme pressures encountered in the lubrication of work rolls and table rolls.

GREASE E.P.

a host of other heavy-duty industrial applications.

Gulfcrown E.P. can be used for electric motor bearings, fans, pumps and for nearly every type of application. Can be applied through centralized systems or by gun. Available in NLGI consistencies 0, 1 and 2.

Find out how Gulfcrown E.P. can improve your operation and help you get lower maintenance costs. Call your Gulf Sales Representative at the nearest Gulf office. Meanwhile, mail coupon for new booklet.

GULF OIL CORPORATION
Dept. DM, Gulf Bldg., Pittsburgh 30, Pa.

Please send booklet on new Gulfcrown Grease E.P.

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

FMM-8209

For more facts Circle 464 on Reader Service Card

NEW 2-SPEED SKIL

BLADE LIFE DOUBLED. Shoe can be repositioned easily with screw driver to use new cutting area of blade after one part is worn. Actually doubles blade life.

CUTS CLOSE to walls—right or left side, up or down, because of off-center blade location, reversible blade.

RECIPRO SAW

CUTS MAINTENANCE, LABOR COSTS...

REPLACES TEDIOUS HAND SAWING

The new SKIL 2-speed Recipro Saw is an entirely new concept in reciprocating saw design. It cuts anything that can be sawed by hand—faster, easier and better. Does the work of keyhole, hack and hand saws 5 to 20 times quicker. It's another major development in the design of power tools by the originators of the famous SKIL SAW.

New 2-speed feature obsoletes all other reciprocating saws. Low speed cuts metal fast with minimum blade wear; high speed makes fastest cuts in wood and compositions. No single compromise speed. And SKIL makes a complete line of 20 Recipro Saw blades to cut virtually any material. It means the right speed plus the right blade for every job.

New off-center blade location allows cutting really close to walls and in tight places where only hand tools could be used before. Another plus is the reversible blade which lets you make close cuts up or down, as well as at the right or left side. And the convenient top handle is removable.

New savings in blade costs alone quickly pay for this new saw—because the new 2-position shoe actually doubles blade life! When one blade section is worn, you just reposition the shoe and cut with a new, unused blade section.

New low maintenance mechanism has only 3 main moving parts. And *all* parts subject to wear are heat-treated alloy steel. All ball-bearings throughout.

New in idea, new in design, new in efficiency—the all-new SKIL Recipro Saw is the most versatile, most universal portable cutting tool ever made.

SKIL

Famous SKIL and SKILSAW products made only by SKIL Corporation, 5033 Elston Avenue, Chicago 30, Illinois. In Canada: 3601 Dundas Street West, Toronto 9, Ontario.

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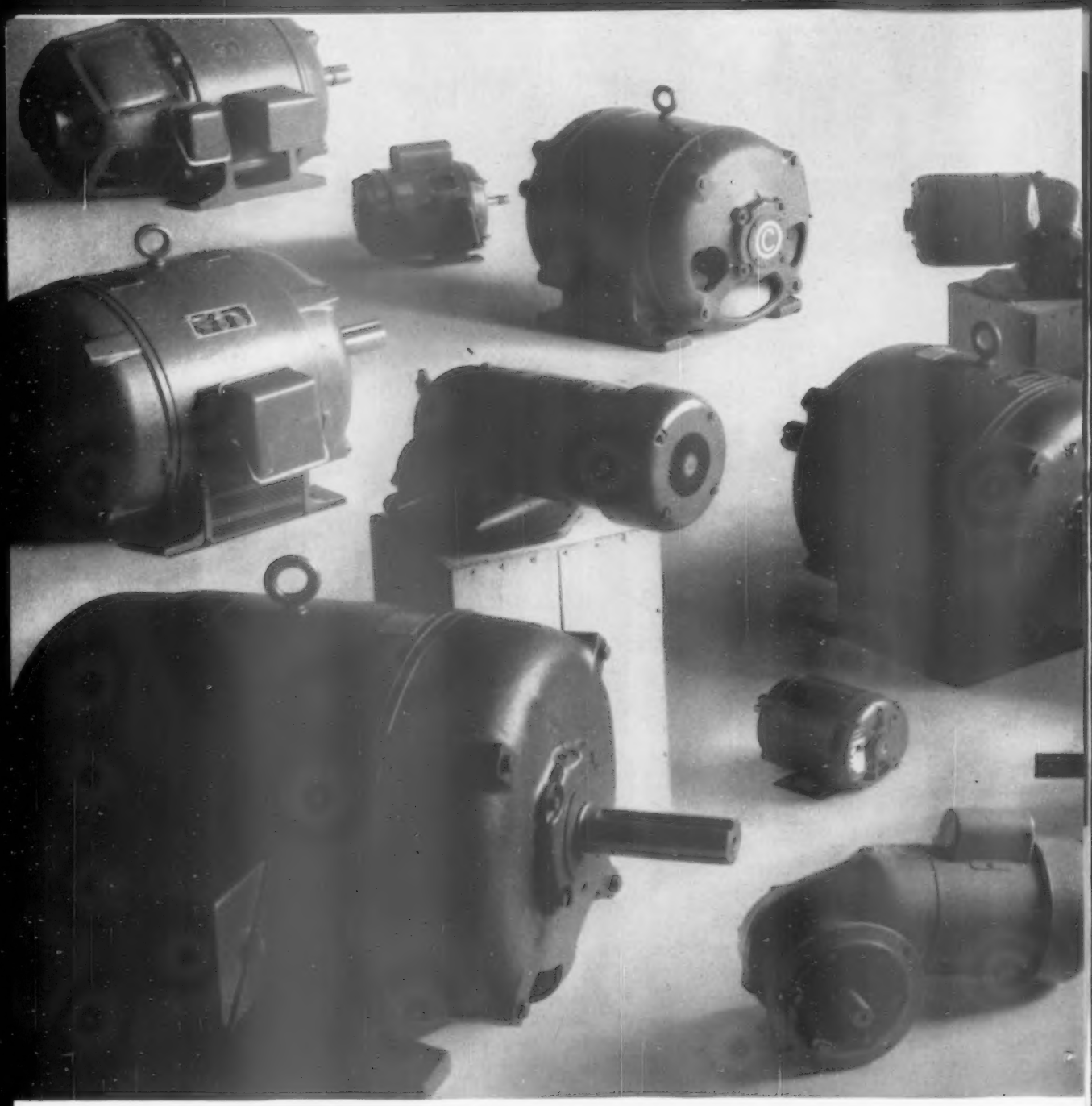


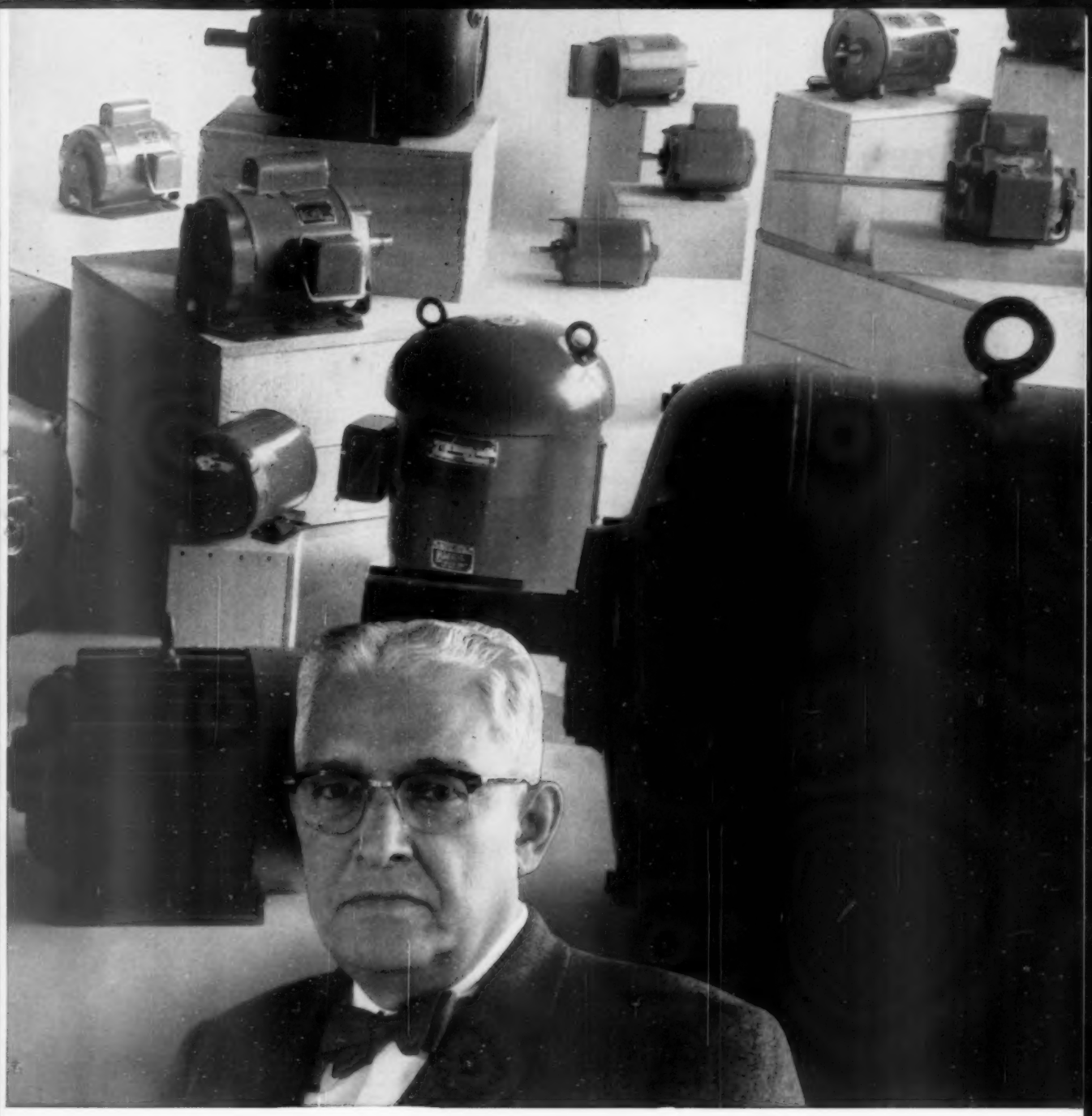
Why you get more than a motor from Century Electric

10,000 choices and advice on

You can't afford to take chances with the most vital link in your production line—motors. You can keep that link strong with Century Electric motors. Here's why:

10,000 types to choose from—It doesn't make any difference what kind of equipment you want to drive—all motorized equipment. And it doesn't matter under what conditions it must operate—dry, moist, acid or dusty—you can get the right motor from Century Electric. In fact, Century Electric makes motors from 1/20 to 400 hp in all kinds of enclosures—over 10,000 different types.

Expert application advice—And you get help in selecting the right motor from these 10,000 types. Century Electric sales engineers sit down with you, go over your problem in detail and give you on-the-



the right one

spot advice. They can do this because they think, sell and apply motors and nothing but motors day after day.

Backing them is an engineering staff able to come up with quick answers like quotes, models and prices. Century Electric sales engineers want to make sure you have the right motor for your application. 10,000 choices and advice on the right one—reasons why you get more than a motor from Century Electric. For more details contact your nearest Century Electric Sales Office or Authorized Distributor.

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

58-6

INVENTORY CONTROL

PUT YOURSELF IN FULL COMMAND OF INVENTORY WITH IBM DATA PROCESSING

What do we have on hand? What are our immediate needs? What will we need in the future? When do we reorder?

With new IBM inventory control methods, you not only answer questions like these precisely, but you also keep inventories at optimum levels . . . reduce shortages . . . cut inventory carrying charges . . . get automatic calculation of materials requirements and ordering quantities.

Results of such control? One manufacturer cut a 24-day inventory reporting cycle down to 24 hours with an IBM 650. Another realized substantial savings by cutting his inventory investment **in half** with an IBM RAMAC® 305.

COMPLETE MANUFACTURING CONTROL

Not in inventory control alone—but in every area of manufacturing—from machine scheduling to market forecasting, from engineering planning to cost analysis, new IBM techniques are revolutionizing management control of manufacturing. In scores of companies, IBM data processing systems are supplying information once impossible to obtain . . . closing the time lag between fact and report . . . and reducing the over-all costs of production.

All these benefits can be brought to your business, too, with methods drawn from IBM's many years of experience.

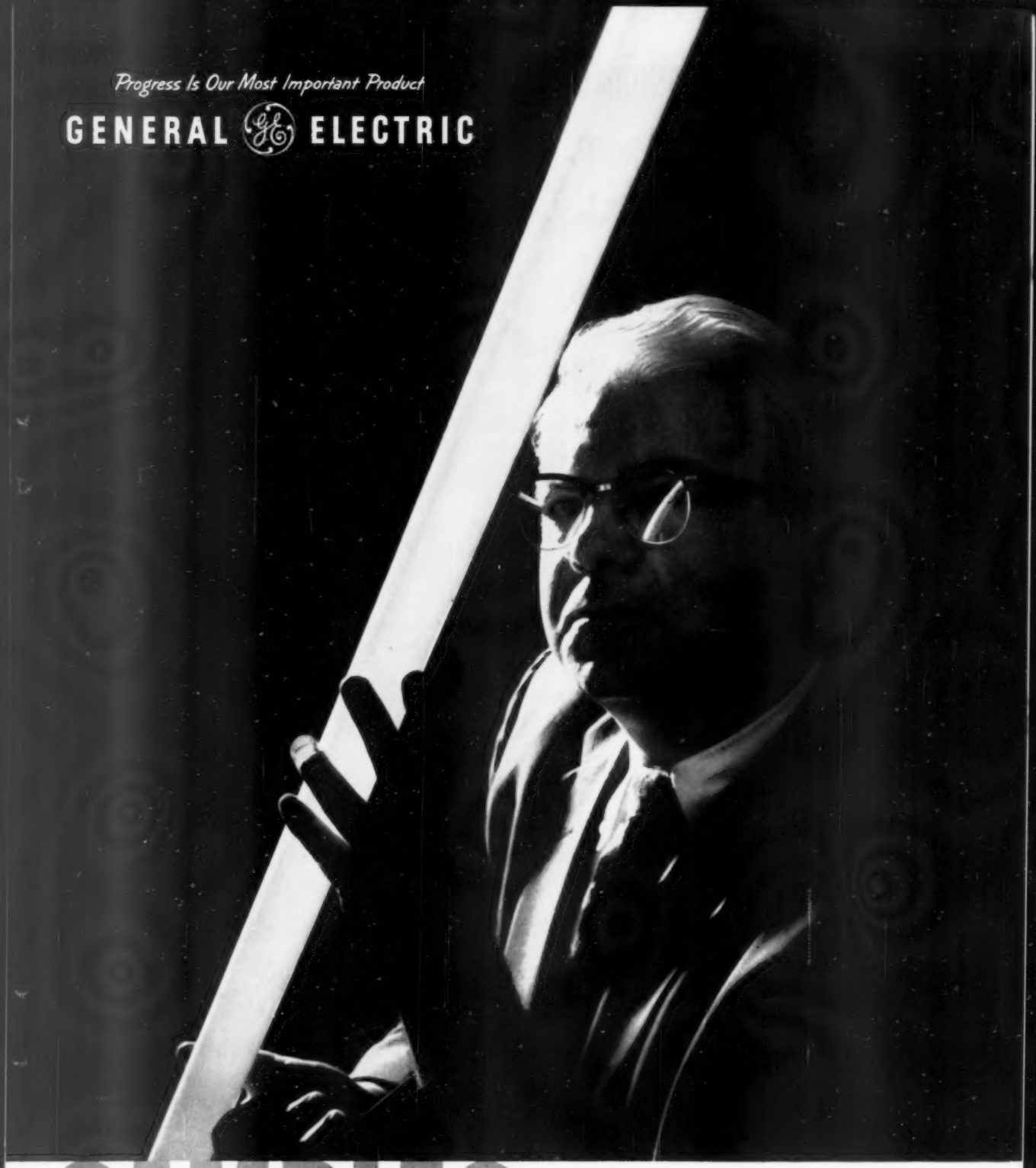
For all the facts on IBM Data Processing, and complete details on IBM Inventory and Manufacturing Control Methods, call your local IBM representative.

IBM®
DATA PROCESSING

For more facts Circle 467 on Reader Service Card

Progress Is Our Most Important Product

GENERAL ELECTRIC



GAMBLE?

"I think I'm about average . . . as P.A.'s go. Regular hours . . . about 10 a day. Occasionally a product comes along that makes my decision easy—like G-E Lamps. Odds are 999 out of 1,000 are sure-starters . . . 99 out of 100 will last about 2 years. And our fluorescent per-case price is less than in 1950!"

GAMBLE? "Why gamble on lamp performance when, on the average, 999 out of 1,000 G-E Lamps are free of any defect which could affect performance in our sockets!"

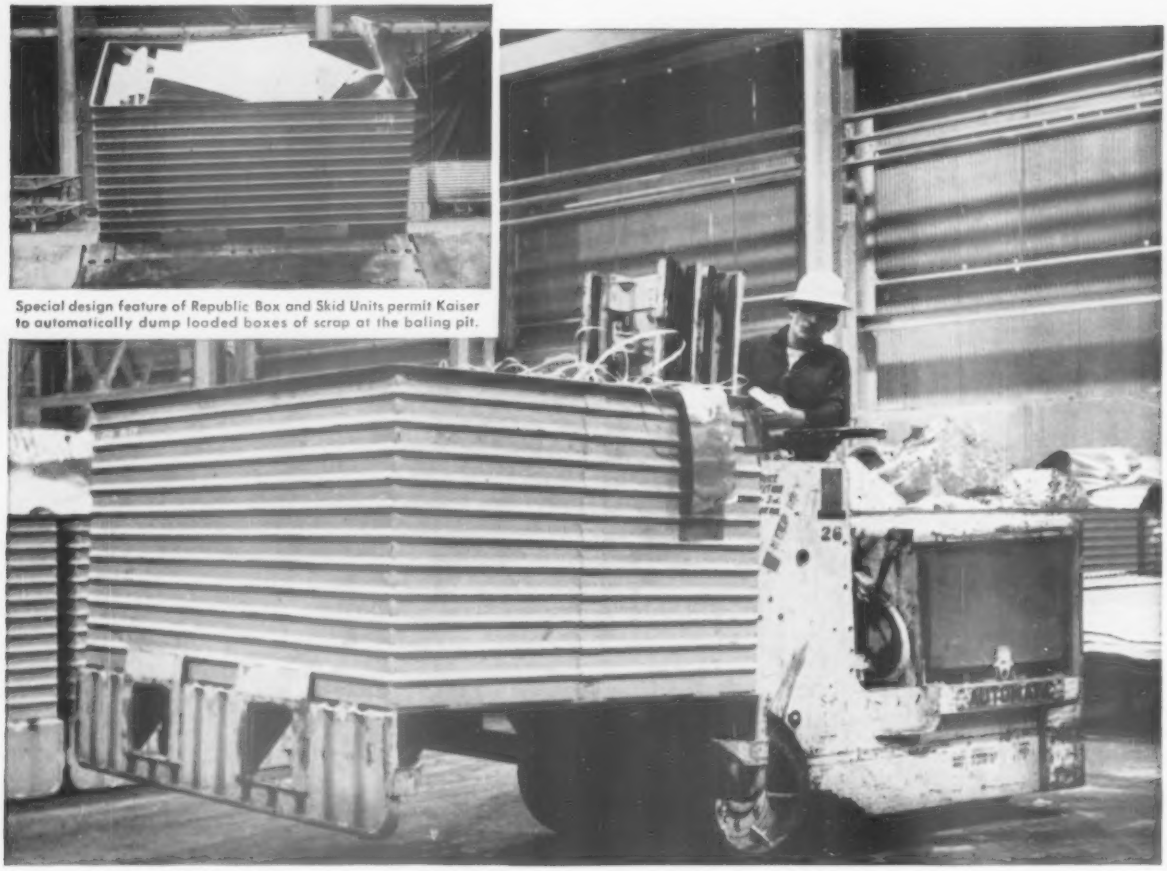
General Electric Co., Large Lamp Dept. C-907, Nela Park, Cleveland 12, O.

For more facts Circle 468 on Reader Service Card

New Materials Handling Ideas from Republic

STEEL BOXES SERVE AS PORTABLE WAREHOUSES, PROVIDE SPEED, ACCURACY IN HANDLING SCRAP

Special design feature of Republic Box and Skid Units permit Kaiser to automatically dump loaded boxes of scrap at the baling pit.



THESE REPUBLIC STEEL BOX AND SKID UNITS ARE PERFORMING DOUBLE DUTY at Kaiser Aluminum & Chemical Corporation's new Ravenswood, West Virginia Works. The units play an important role in helping Kaiser maintain its scrap identification and separation system.

The boxes are used first in finishing areas where scrap is generated. When filled, each box is tagged to indicate the type of alloy it contains. Then it is picked up and moved by fork lift truck to a storage area where it serves as a portable warehouse. The boxes remain in storage until the scrap is scheduled for baling and remelt.

The boxes, designed and built by materials handling specialists at Republic's Berger Division, measure 6′ 5″ long, 4′ 6″ wide, and 4′ 1½″ high. They are built for 8000 lb. load capacity. The skid sections are designed for four-way entry by fork truck to provide easy handling in restricted space. This design feature also permits the boxes to be dumped automatically by a tipping device at the baling pit.

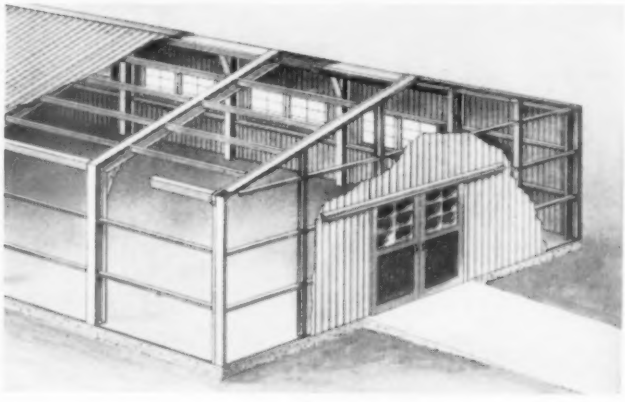
In addition to fast, accurate scrap handling, Kaiser should also benefit from future savings in maintenance costs. Corrugated construction of the box and skid units adds strength and rigidity, assures long service life at the lowest per-year cost.

Talk over your handling or storage problems with a Republic Specialist. He will help you select or design a standard or special unit that could save time, cut costs, simplify an operation. There is no obligation. Contact your Republic Materials Handling Representative. Or mail the coupon.

For more facts Circle Reader Service Card numbers as follows:

SPACE-SAVING HIGH STACKING WITH THE WORLD'S STRONGEST SHELVING. It's Wedge-Lock Steel Shelving manufactured by Republic's Berger Division. The secret of high stacking is in Wedge-Lock's exclusive sway-proof joint that actually becomes tighter as the load increases. Wedge-Lock includes the three essentials of good steel shelving: a post that will not buckle, a reinforced shelf that does not sag, a concealed sway-proof joint. Berger storage engineers will help you design an installation to fit your needs. Mail coupon for details.

SIMPLIFY PALLETIZING AND STACKING, SAVE SPACE with Republic Steel Pallet Racks. The savings of palletized handling now can be applied to bulky, uneven, odd-lot, and fragile materials. Republic Steel Pallet Racks make palletizing practical. Tubular steel supports adjust every six inches to handle palletized material of any height. Select single pallets from any level without restacking. Two-way entry permits loading and unloading from either side. Send coupon for complete specifications.



TRUSCON'S NEW COMPLETE STEEL BUILDINGS are low in cost, quickly erected, reusable. These new "Budget Buildings" by Republic's Truscon Division bring the cost of additional storage space down low. Simplified design permits fast on-site erection. No painting needed. Siding, roofing, doors, windows, hardware all included. Immediate delivery in widths 32, 36, 40, 44, and 48 feet . . . 12- and 14-foot heights. Lengths as long as you want them. Send coupon for bulletin covering complete facts.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. FA-6177-R
1441 REPUBLIC BUILDING · CLEVELAND 1, OHIO

☐ Have a Materials Handling Engineer call.

Send more information on:
☐ Materials Handling Equipment ☐ Steel Pallet Racks
☐ Wedge-Lock Steel Shelving ☐ Truscon "Budget Buildings"

Name_____ Title_____

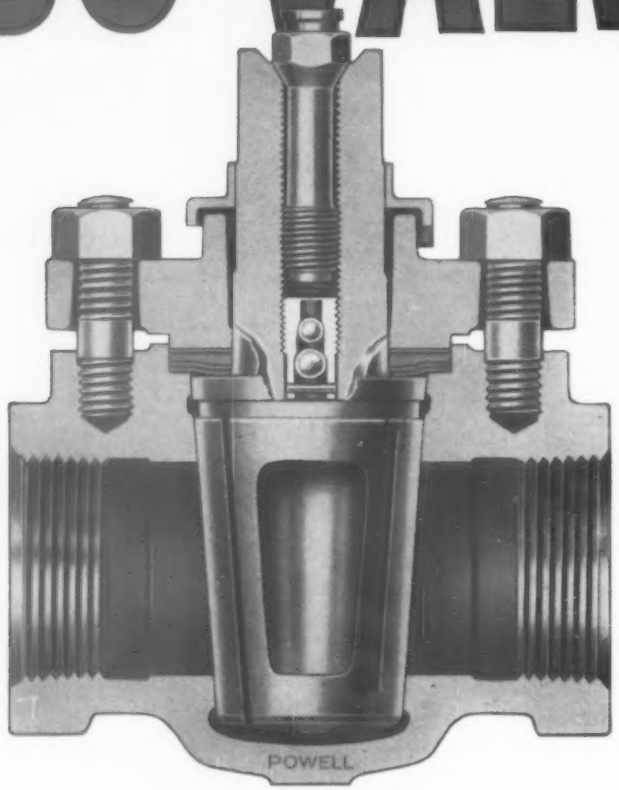
Company_____

Address_____

City_____ Zone____ State_____

469 Materials Handling, 470 Steel Shelving, 471 Pallet Racks, 472 Budget Buildings

POWELL
LUBRICATED PLUG VALVES



Sectional-Powell Lubricated Plug Valves, Single Gland type. Also available with Flanged Ends.

Powell Lubricated Plug Valves have many advantages over conventional types of Valves:

- **Simple design**: only 3 basic parts—body, bonnet, plug.
- **Quick**, complete shut-off.
- **Tapered Plug** assures positive seating.
- **Machined** surfaces of plug and body are not exposed in open position.
- **Cavity-free** straight passage assures streamlined flow.

Available in sizes ½", through 16", depending on the type required—semi-steel 175 and 200 pounds WOG; carbon-steel ASA 150 and 300 pounds. Also in other alloys on special order.

For complete information, write for our new Lubricated Plug Valve Catalog, Number PV-5. Or contact your local Powell Distributor.

The Wm. Powell Company • Cincinnati 22, Ohio
Dependable Valves Since 1846

POWELL...world's largest family of valves

For more facts Circle 473 on Reader Service Card

Depend on your AIM* . . . Downing Box Company did . . .

Push-button strapping machine unitizes KD cartons

Acme Idea Man Harold Meyer introduced the F-3 Strapping Machine to Downing Box Company.

Downing Box Company, Milwaukee, Wisconsin, wanted to streamline the unitizing of KD corrugated cartons. Their Acme Idea Man came up with a solution that has meant easier handling, better stacking and greater product protection: a new system incorporating the Acme Steel F-3 Strapping Machine. (Idea No. S3-49)

Now, with a single F-3 Strapping Machine, up to 100 units are strapped in an 8-hour shift with one operator.

The F-3 successively compresses the unit and tensions, cuts and seals one strap—or two or three straps simultaneously—while the unit is still under compression. Air-powered and electrically controlled with push-buttons, it applies each strap with uniform, pre-determined tension.

***Depend on your Acme Idea Man.** Ask him for ideas that will give you easier handling, better storage, faster and safer shipments. Write Dept. FAS-49. Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois. In Canada, Acme Steel Company of Canada, Ltd., 743 Warden Ave., Toronto 13, Ontario.

ACME STEEL **STEEL STRAPPING**

ROSS
Air Systems

Engineered Atmospheres for Better Processing

Ross foam rubber curing oven

MODERN

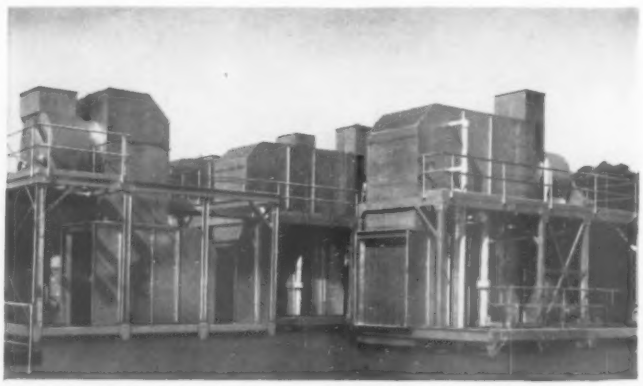
THE ANTIDOTE FOR A POISON

The poison? Obsolescence! The use of a machine that is past its 'point of no return' may not show up too strongly in your unit cost structure now but its cumulative effect is devastating. It's slow poison... slowly sapping the production strength of the user. The longer an obsolete unit remains in service the greater is the unit cost gap between the old and what a modern unit would do. If you have obsolete

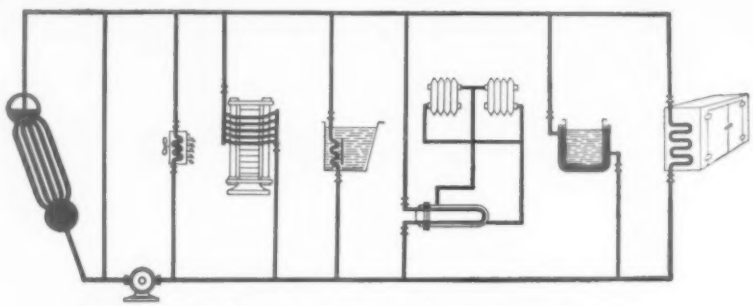
OPERATIONS WHERE MODERNIZATION WILL PAY OFF!

Paint Finishing
•
Washing, Drying, Baking, Curing
•
Conversion Operations
•
Process Heating
•
Air Heating
•
Air Distribution; Fans; Ducts; Nozzles
•
Industrial Air Conditioning
•
Heat Recovery

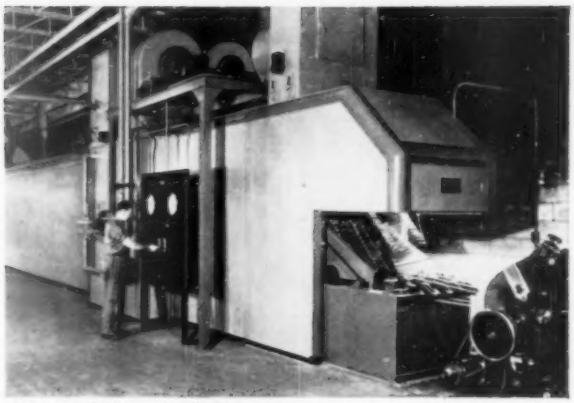
Any process that needs its components brought up to date so that they conform to the modern practices and make use of the latest in design.



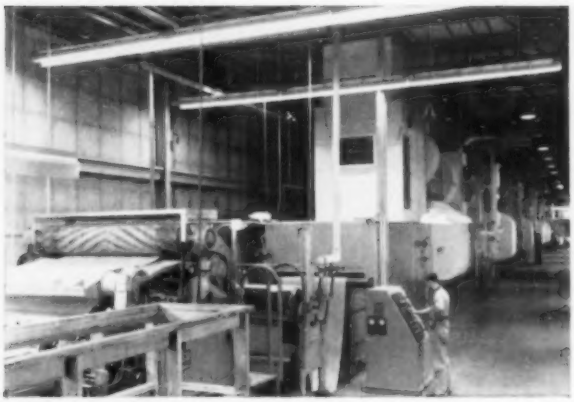
Ross-Briner economizer; aluminum construction for roof installation



Schematic layout of typical Supertherm high pressure water system to replace *uneconomical* existing process and comfort heat system



Ross metal decorating baking oven



Resin core stock oven

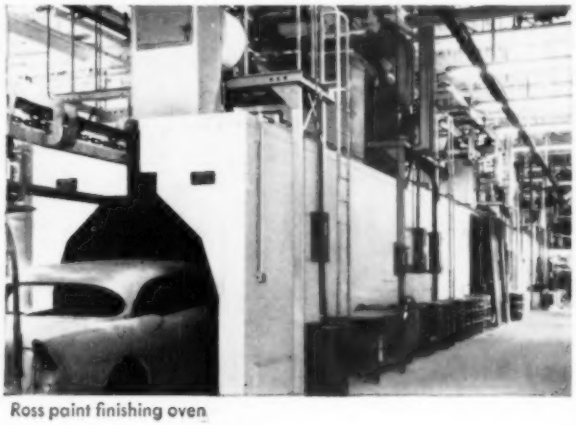
IZATION

AFFLICTING MANY COMPANIES

equipment you are in a slowly deteriorating competitive position.

Why not check all operations in your plant that directly or indirectly involve what we call the 'Engineered Atmosphere'? Ask a Ross Specialist to make a study of the systems, equipment and auxiliary units to determine just what *is* obsolete. He will submit a detailed report as to which should be modernized to bring about the greatest reduction in unit costs. His report will be based on his broad knowledge of 'Engineered Atmospheres' and years of experience in designing the equipment and systems noted in the accompanying list.

Ross core curing oven (foundry)



Ross paint finishing oven

M-R MIDLAND-ROSS

THE MIDLAND-ROSS GROUP OF COMPLEMENTING SERVICES

J. O. Ross Engineering, New York
John Waldron Corporation, New Brunswick, N. J.
Andrews and Goodrich, Boston
Ross Engineering of Canada Limited, Montreal
Ross Midwest Fulton, Dayton
Hartig Extruders, Mountainside, N. J.
Carrier-Ross Engineering Company, Ltd., England

J. O. ROSS ENGINEERING
Division of Midland-Ross Corporation

444 Madison Avenue, New York 22, N. Y.
ATLANTA • BOSTON • MT. PROSPECT, ILL.
DETROIT • LOS ANGELES • SEATTLE

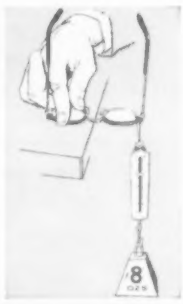
UNQUESTIONED SAFETY PLUS EYE APPEAL THAT SPEAKS FOR ITSELF

New... *Safemaster*

Safety Glasses that are Good Looking from Any Angle

Here's eye protection *any* worker can be proud to wear in either plano or Safety Rx glasses — SAFEMASTER, latest addition to the American Optical line. MORE IMPORTANT, IT IS TRULY DESIGNED AND ENGINEERED SAFETY EQUIPMENT THAT MEETS ALL EYE PROTECTION STANDARDS. Frame is made from the same high-quality nickel silver as our popular F5100 line.

The trim is durable nonflammable plastic — workers will appreciate the freedom from glare reflection. Every frame must pass the edge transverse test, the flat transverse test and the solder joint test of the National Bureau of Standards. The catalog number of SAFEMASTER is F5200. Protect your workers with SAFEMASTER, another quality AO Ultrascopic Safety Spectacle that *looks good while guarding against eye accidents.* Your nearest AO Safety Products Representative can supply you.



QUICK FACTS

- 4 Eye sizes — 5 Bridge sizes
- Comfort cable and spatula tip temples
- Engraved eyewire — adds a distinctive touch
- Non-snagging screw heads on endpieces
- Acetate non-corrosive nose pads. Adjust by universal pivot. Easy to replace
- Strong, double-braced bridge has 4 contact points — 4 solder points securely attached to frame (An AO exclusive)
- AO 6 curve Super Armorplate clear or medium, dark or extra dark Calobar lenses, interchangeable right and left

NOTE: Because of SAFEMASTER's handsome appearance, many workers who need protection as well as correction are certain to say: "That's for me!" And why not? Remember, Super Armorplate lenses may be ground to the worker's prescription.

Always insist on AO Trademarked Lenses and Frames

American Optical COMPANY
SAFETY PRODUCTS DIVISION

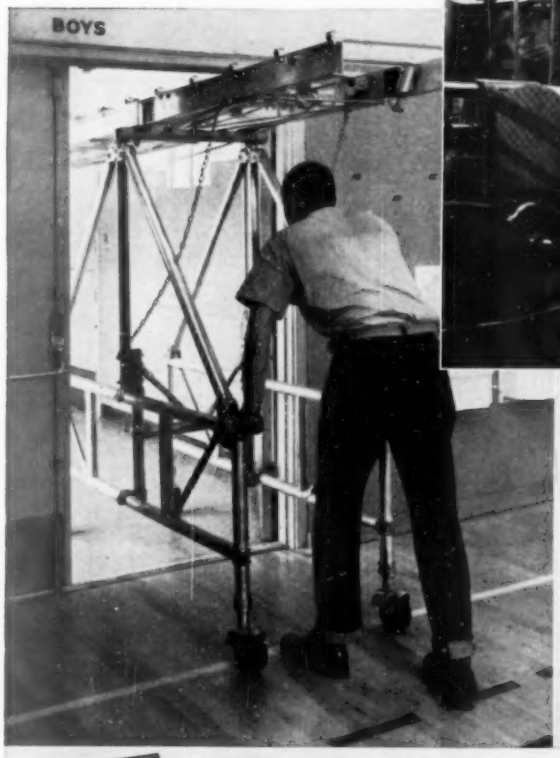
SOUTHBRIDGE, MASSACHUSETTS
Safety Service Centers in Principal Cities

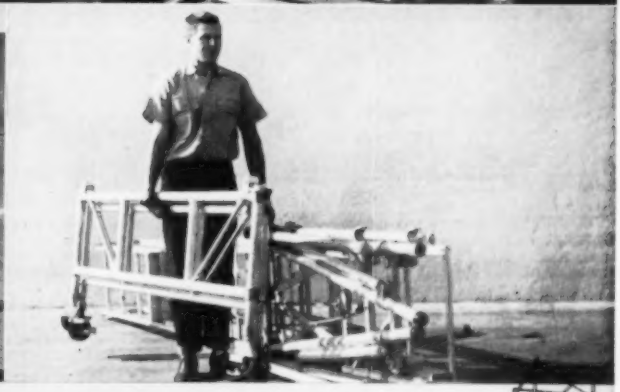
 For more facts Circle 476 on Reader Service Card

UP-RIGHT ANNOUNCES

TALLESCOPE ...telescoping aluminum work platform for overhead spot maintenance

Lightweight, rapidly assembled by one man. Extends instantly for reaching heights up to 30 ft. Adjustable legs for uneven floors or stairways. Only 29" wide for rolling through congested areas.





Telescopes and folds down to roll through doorways, under trusses, pipes and conveyors.

Separates easily into 3 components for convenient storage or transportation.

FOR TALLESCOPE CIRCULAR
WRITE TO
UP-RIGHT SCAFFOLDS
DEPT. 178 • 1013 PARDEE ST., BERKELEY, CALIF.

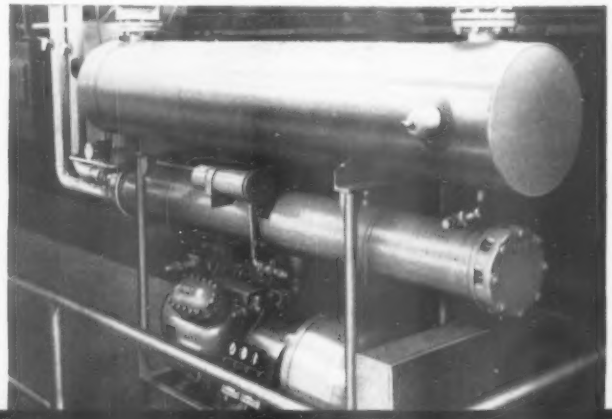
MANUFACTURED BY
UP-RIGHT
SCAFFOLDS

For more facts Circle 478 on Reader Service Card

Now! Air condition key Trane Self-Contained

Cool larger areas with this newly designed commercial size TRANE Self-Contained unit. Usually installed outside the conditioned space, it delivers a large volume of conditioned air. 20, 25 and 30-ton models with water or air-cooled refrigeration system. 10, 15 and 20-ton models with built-in water saver.

Chilled water for central air conditioning systems or for process cooling is provided by this TRANE Cold Generator. Factory-assembled for fast, easy installation. Features new compressor, designed for either R-22 or R-12 refrigerant. Four-step compressor modulation cuts power costs.



plant areas with Climate Changers!

Cool laboratory, offices, drafting room—on a budget—with a quiet, efficient packaged unit

Here's how you can cool critical areas in the plant—have just the cooling you want, where you want it! Install one or more TRANE Self-Contained Climate Changer units and enjoy *high production climate* . . . peak performance, with a trim, compact packaged unit.

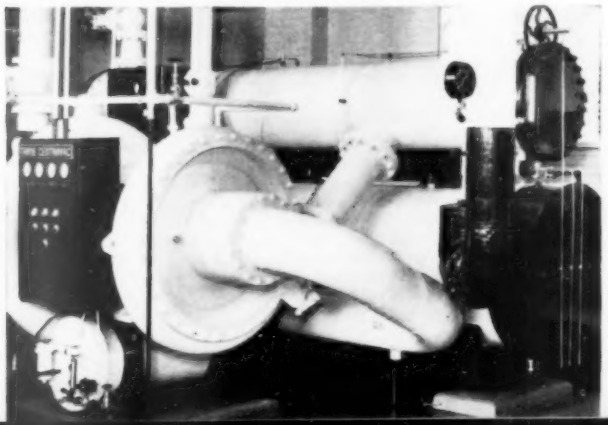
These units provide crisp, cool air for special areas in the manufacturing plant where summer heat reduces efficiency, lowers production. Install them in the laboratory, drafting room, offices—wherever you need summer cooling on a budget.

Designed and built by a leader in big building air conditioning systems, these new TRANE Climate Changer units give you traditional TRANE engineering excellence, dependable performance. And they're especially *quiet*—won't disturb personnel. Self-Contained Climate Changers may be installed right in the conditioned space—or located remotely, with a simple ductwork system bringing in the cooled, filtered, de-humidified air. And there are Climate Changer units in all sizes from 3 to 30 tons, air or water-cooled, to meet the cooling requirements of any space within your pla·

WANT MORE FACTS? When you plan cooling for your building—for limited areas or for the entire plant—turn to TRANE! Have your architect, contractor or consulting engineer talk with your nearby TRANE Sales Office. Or write TRANE, La Crosse, Wisconsin.

This TRANE Self-Contained unit provides cooled, filtered, dehumidified air for offices or critical plant areas. And it needs no water! Air-cooled, it's easy to install, quiet in operation.

For larger jobs, a TRANE CenTraVac provides chilled water for comfort or process cooling . . . sizes to 1500 tons. Available in electric or steam driven models; open or hermetic design. All models modulate to 10% of capacity—or lower—with power savings in almost direct proportion to load. Fully automatic, no full-time attendant needed.



For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA. CLARKSVILLE MFG. DIV., CLARKSVILLE, TENN. • TRANE COMPANY OF CANADA, LIMITED, TORONTO • 97 U.S. AND 19 CANADIAN OFFICES

For more facts Circle 479 on Reader Service Card

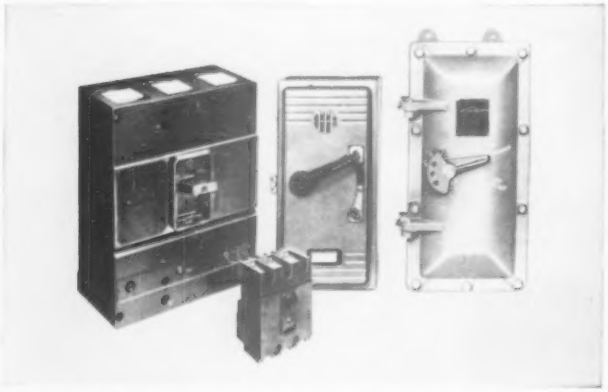
I-T-E CIRCUIT BREAKER COMPANY

SAFETY

Yes, there's real economy in fused power switching centers, but make sure you also get the *extra safety* only I-T-E offers. In every I-T-E Power Switching Center, you have the assurance of knowing that switches can be closed *even into a fault* with complete safety for both personnel and equipment. Toggle-snap quick closing prevents burned contacts. In addition, Kirk key interlocks prohibit the opening of fuse compartment doors while switches are closed.

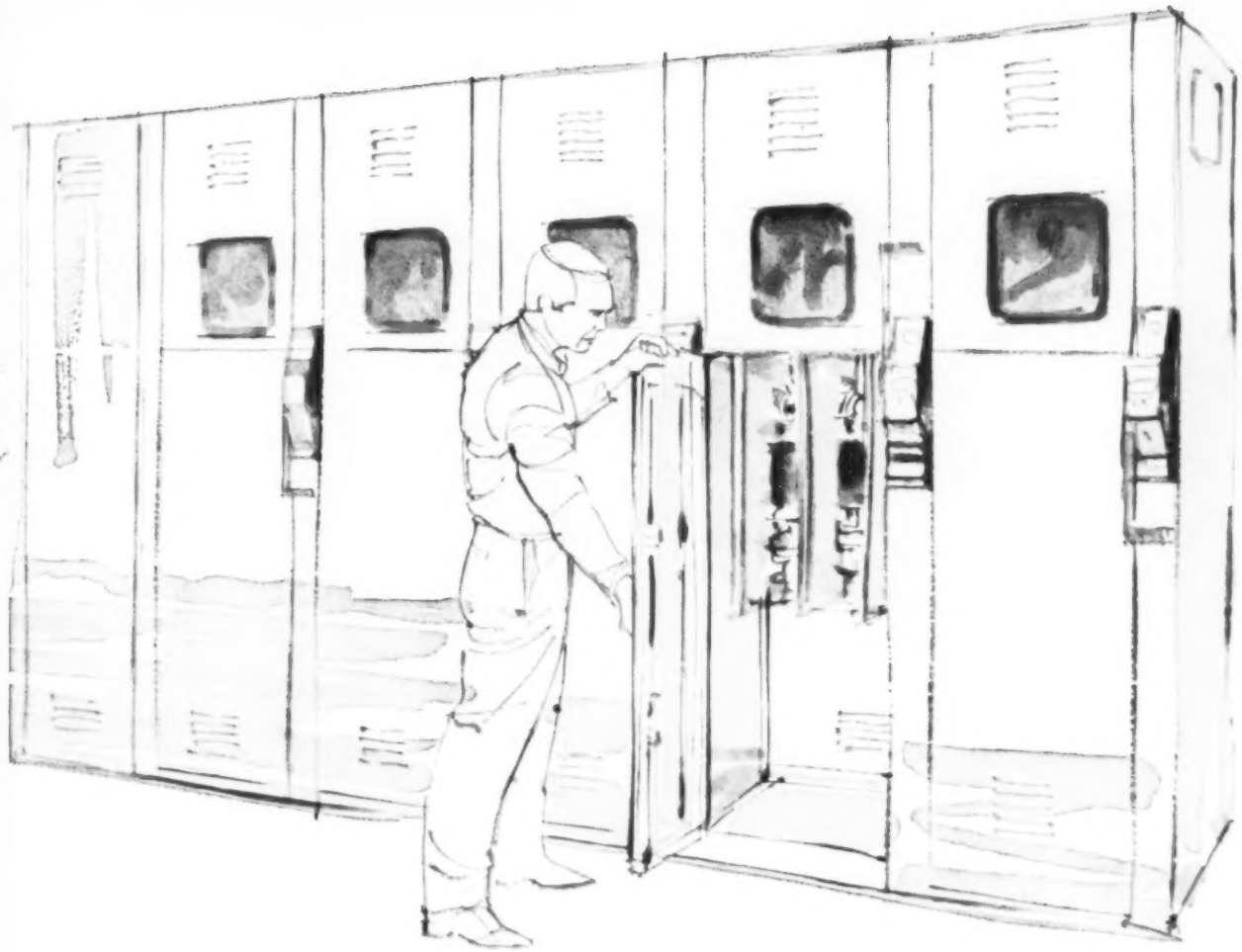
I-T-E Power Switching Centers are designed, of course, for both safety and economy. Unique I-T-E standardized cubicles and building block construction reduce engineering expense (the saving is passed on to you), and also shorten the time between order and delivery. Equipment arrives on the job in sturdy, preassembled units, ready for easy, fast installation. And new feeders can be added any time.

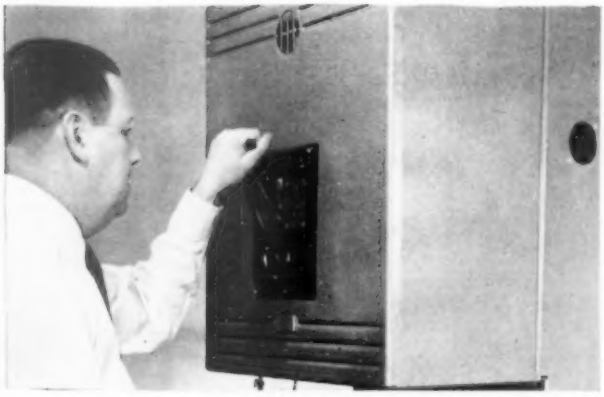
These extra advantages add up to greater value . . . because you pay no more for I-T-E electrical equipment. That's why it is preferred among so many companies that insist on greater value. Investigate I-T-E equipment next time you buy.



First cost is your last cost. I-T-E molded case circuit breakers not only give you vastly better protection than fused devices . . . but in most cases they actually cost you less in the long run. To restore power after a fault, all you do is flip a toggle handle. Nothing to replace. No lost time. And you're absolutely certain that you have correct protection. Choose the circuit breakers you need from the I-T-E line . . . broadest in the field. Wide variety of enclosures for both indoor and outdoor installations.

Safety for conductors. I-T-E nonsegregated phase bus, safely enclosed in metal, shrugs off the hazards of dust and weather and provides complete protection for plant personnel. Widely used for connecting transformers to switchgear and for distributing power in factories. Far easier to tap into than cable. High dielectric strength. Available in a variety of types for indoor and outdoor installations. Ratings up to 13.8 kv and 3000 amp. I-T-E nonsegregated phase bus is delivered factory fabricated for easy installation and sure fit.





Individual circuit control. Install these new URELITE individually enclosed circuit breakers right near heavy loads or as local control devices for main trunk lines up to 600 volts. Main disconnect contacts visible through side window for extra safety. Now available with I-T-E K-LINE circuit breakers . . . world's most advanced. Pulldown handle action provides quick manual make for safety and long contact life. New, wide-range overcurrent trip device lets you increase breaker setting when the load increases. No parts to replace.

I-T-E Circuit Breaker Company I-2
1900 Hamilton St., Philadelphia 30, Pa.

- ☐ Power switching centers
- ☐ Molded case circuit breakers
- ☐ Metal-enclosed bus
- ☐ URELITE circuit breakers
- ☐ Other_____
- ☐ Metal-clad switchgear (4.16 and 13.8 kv)
- ☐ Secondary unit substations
- ☐ TRANFO-UNITS
- ☐ CORDON® circuit breakers

Name_____ Title_____

Company_____

Street_____

City_____ Zone____ State_____

SEND COUPON OR WRITE

Get complete, up-to-date information on I-T-E equipment.

"Here at HONEYWELL we're control men

Honeywell
H First in Control

"We have a basic philosophy here at MINNEAPOLIS-HONEYWELL. As control specialists, we've learned that it is our *specialist's approach* to design, installation and service that enables our controls and instruments to do their best in operation.

"We feel the same way about elevators. We have 4 OTIS Passenger Elevators and 6 OTIS Freight Elevators in our Minneapolis plants. We know that they'd end up as strangely *mixed breeds* if we attempted their maintenance — because a careful study of the OTIS *specialist's approach* to maintenance has convinced us that only OTIS can keep our elevators running like new."

What is the OTIS *specialist's approach* to elevator maintenance? It is MEN . . . MATERIALS . . . METHODS.

MEN: Elevator maintenance is no one-man job. It is an organization task requiring experts in many lines. No individual, even if he devoted his entire time to the job, could do it properly. It calls for men with an unusual combination of skills plus long OTIS training in studying parts, assemblies, functions, replacement procedures, testing and adjusting. Some degree of elevator complexity can be gleaned from the illustration at the right.

MATERIALS: Original OTIS parts and specially designed OTIS maintenance equipment are within one hour of 90% of all OTIS elevators in the U. S. for use in scheduled replacements—and to hold emergency shutdowns to a minimum.

METHODS: With more than 40,000 elevators under OTIS maintenance, OTIS has developed an actuarial procedure that replaces wearing parts well in advance of their breakdown point to hold shutdown to an absolute minimum and assure the highest possible safety.

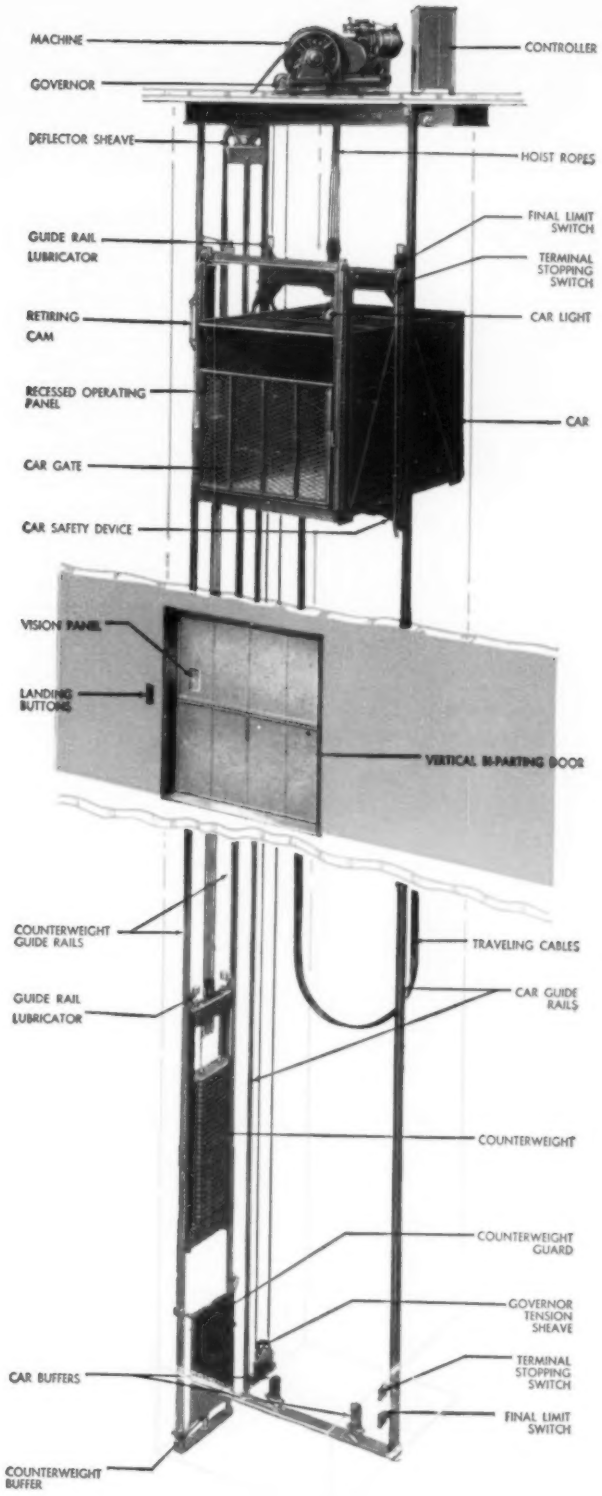
elevator maintenance

THAT KEEPS ELEVATORS RUNNING LIKE NEW

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

FACTORY

. . . not elevator maintenance men"

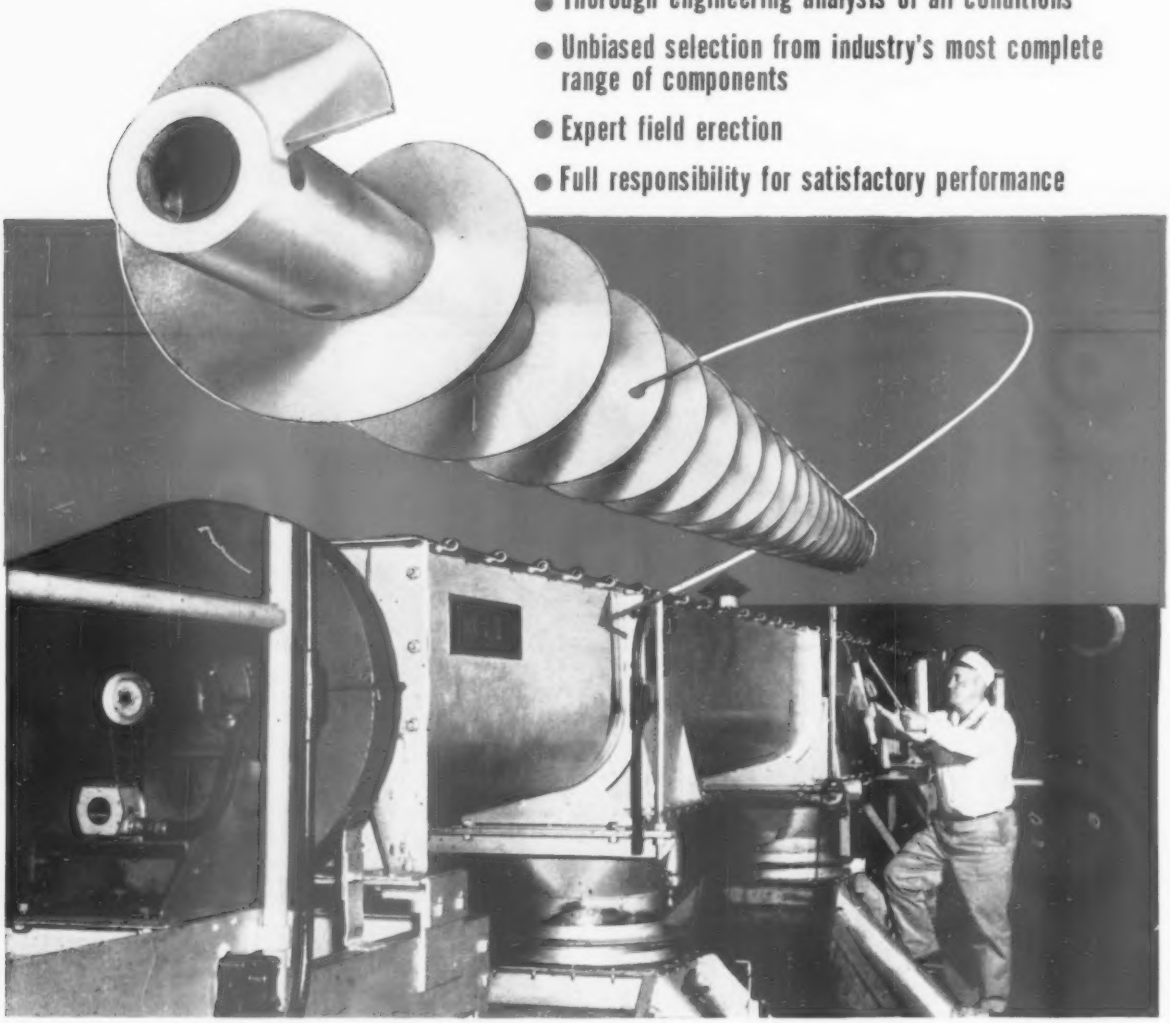


For more facts Circle 481 on Reader Service Card

Here's why a Link-Belt engineered screw conveyor installation means

a better-working system ...less work for you

- Thorough engineering analysis of all conditions
- Unbiased selection from industry's most complete range of components
- Expert field erection
- Full responsibility for satisfactory performance



FROM design of equipment to operation, you leave nothing to chance when you leave everything to Link-Belt's complete screw conveyor service. Whatever your needs, Link-Belt can engineer a system to meet them exactly . . . if desired, will handle entire erection and accept full responsibility for placing your system in operation.

Included in Link-Belt's full line of components are 17 basic screw designs, available in a variety of metals. Each offers Link-Belt's exclusive Quik-Link feature that permits fast, easy removal of any conveyor screw section or hanger without disturbing other components. An equally complete line of troughs, ball and babbitted bearing hangers, trough ends with ball bearing flange blocks and trough end seals, couplings, gates, spouts, and drives makes Link-Belt your convenient, one-source supplier for all your requirements. Ask your nearest Link-Belt office for Data Book 2289.

LINK-BELT

14,707

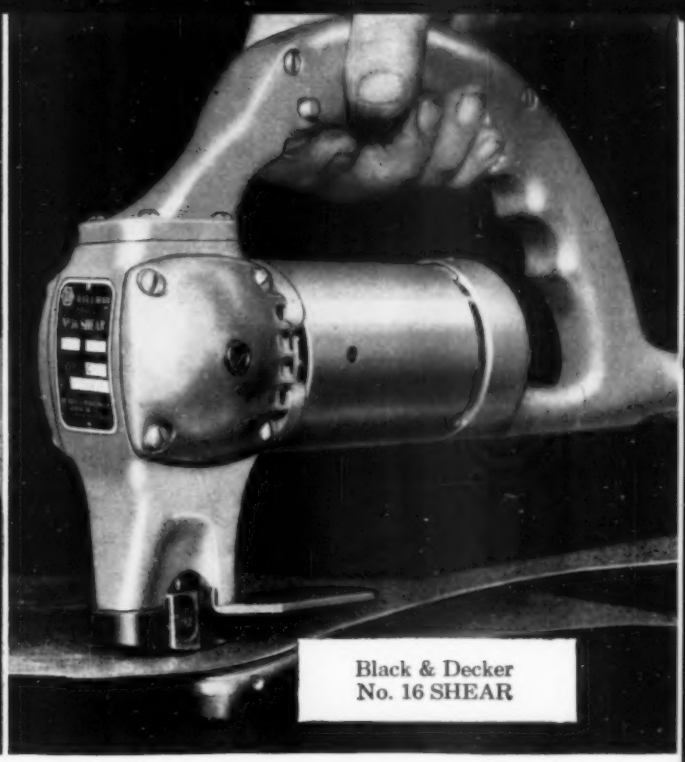
SCREW CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

For more facts Circle 482 on Reader Service Card

For more facts Circle 483 on Reader Service Card ➤

Black & Decker
No. 16 NIBBLER



Black & Decker
No. 16 SHEAR

Slash metal cutting costs with speedy B&D Tools!

Faster, lighter, easier handling, POWER-BUILT and packed with features

Whether you need the speed of shears or the more precise performance of nibblers—you'll find a lot to like in the easy handling Black & Decker No. 16 Shear and No. 16 Nibbler.

By actual test, they're faster and longer-lived—dramatically cut costs. Their lighter weight means easier handling—centrifugal fans give cooler running. Each has exclusive construction features to stand up under the shock of sheet metal cutting.

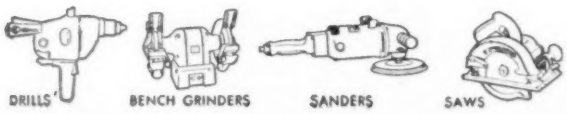
Try these new tools at your nearby Black & Decker distributor. There's a No. 12 Shear, too, for heavier work. For full details on new features, write to: THE BLACK & DECKER MFG. CO., Dept. 0704, Towson 4, Maryland. (In Canada: Brockville, Ontario.)

Look Under "TOOLS-ELECTRIC" in "Yellow Pages"

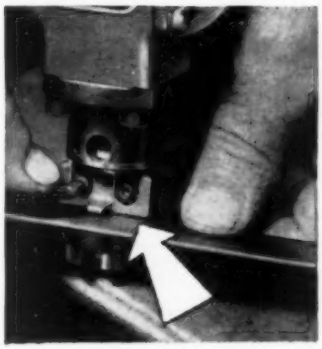
Leading Distributors Everywhere Sell

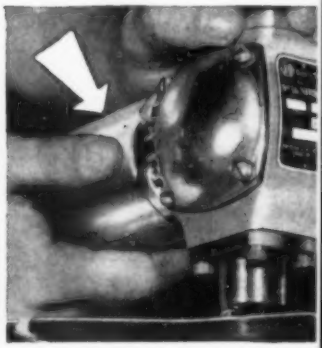
B&D Black & Decker®

Portable Electric Tools—Power-Built to set the pace

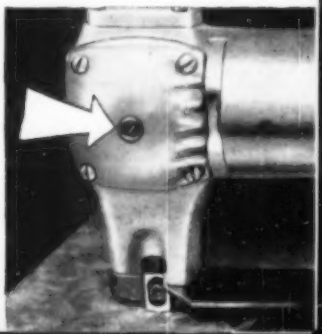


DRILLS BENCH GRINDERS SANDERS SAWS



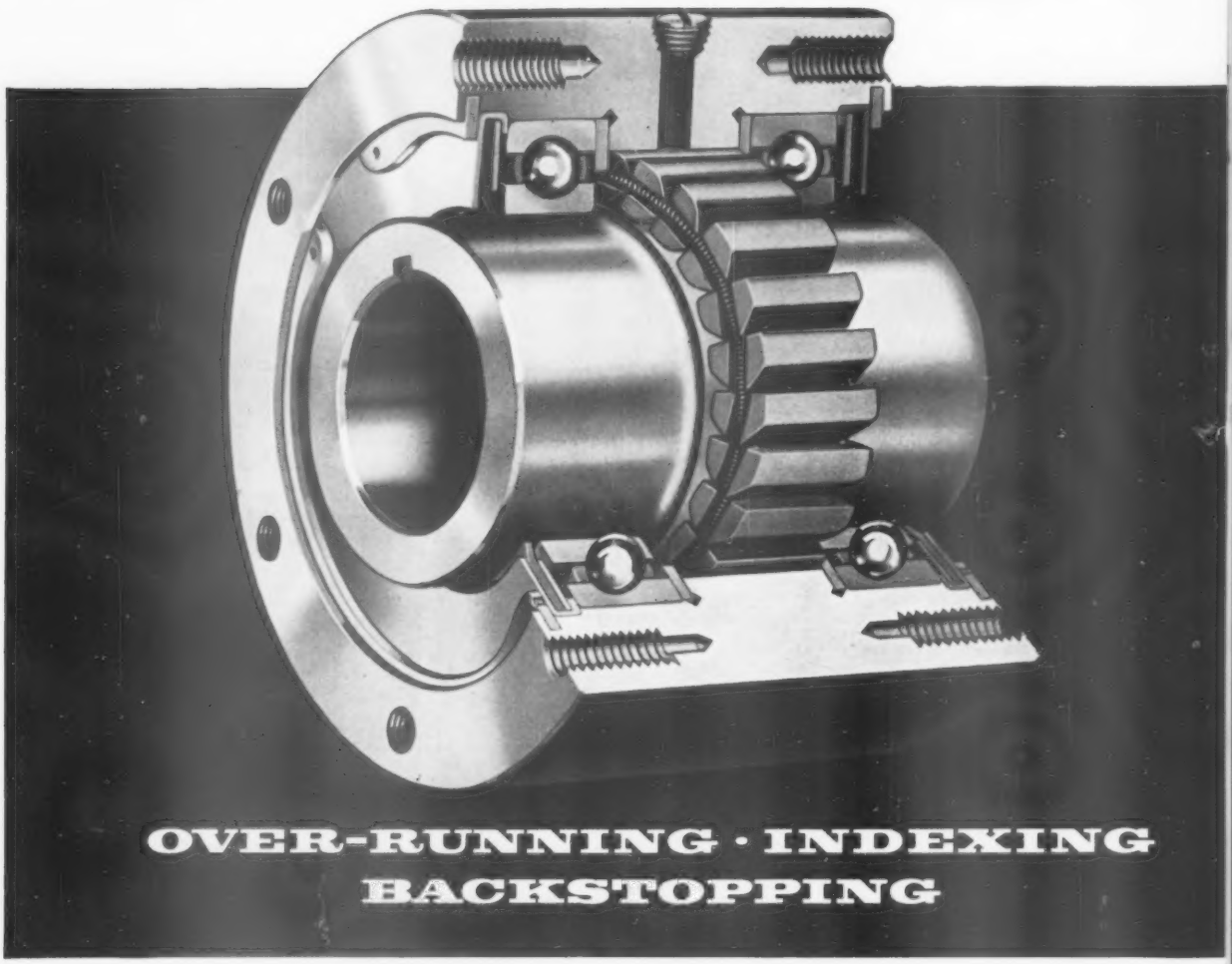


UP TO 3 TIMES FASTER than competition, new B&D Nibbler has twice the life, 20-30% less weight, reversible punch. Adjustable stripper plate (left), smaller diameter (right) are extra features.



50% FASTER than competition, new B&D Shear has one-third less weight than closest competitor, lasts much longer. Deflector plate prevents curling of material. Adjusting screw allows quick positioning of blade.

The OVER-RUNNING CLUTCH With

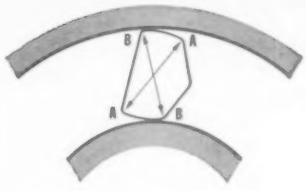


OVER-RUNNING · INDEXING
BACKSTOPPING

THE CLUTCH WITH THREE FULL LIVES

A Formsprag Clutch can be factory-rebuilt easily and economically. Its design makes possible *two* rebuilds, through the use of special over-size sprags. Factory rebuilt Formsprag clutches carry the same warranty as do new Formsprag clutches. When a Formsprag clutch requires reconditioning, contact your local Formsprag distributor for fast, dependable service. Write for catalog and informative new bulletin "Don't Just Replace . . . Modernize!"

HERE'S



The Formsprag clutch consists of a full complement of shaped sprags, or wedges, located between concentric inner and outer races. Power is transmitted from one race to the other by the wedging action of the sprags. Each sprag is so shaped that dimension AA is greater than BB. Rotation of one race in the "driving" direction causes the sprags to wedge, transmitting torque in full from one race to the other.

Greatest Torque
Per Inch – Per Ounce

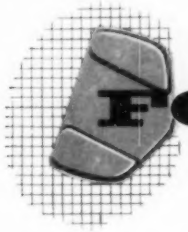
Here's the place to start cutting maintenance costs right now! Nearly every piece of equipment in your plant has one part in common . . . a power transmission device. As clutches in these wear out, replace them with modern Formsprag clutches, used throughout industry in over-running, indexing and back-stopping applications.

Formsprag clutches give you greater torque capacity for their size and weight than any other clutch. Along with this, they are easy to install and require minimum maintenance. Simple in design, with just four basic parts, they have no complicated mechanisms to get out of order. There is no measurable backlash in these precision clutches. They come as a package, ready to install instantly without disassembly, are backed by unexcelled factory service facilities, and are available at stocking distributors across the country.

There is a size and model Formsprag clutch for every replacement or O.E.M. need. Manufactured in sleeve bearing, ball bearing, miniature and large bore backstop types having up to 136,000 ft. lbs. capacity with bores up to 12 inches. Formsprag also manufactures clutch-coupling units. All are illustrated in the new Formsprag catalog, complete with specifications, performance data and applications. Ask your Formsprag distributor, or write us direct for your free copy.

FORMSPRAG COMPANY
23609 Hoover Road, Dept. 100
Warren (Detroit), Michigan

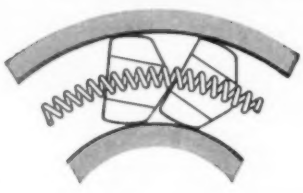
In Canada: Renold Chains Canada, Limited
In United Kingdom: Renold Chains, Limited
Distributors in Principal Cities

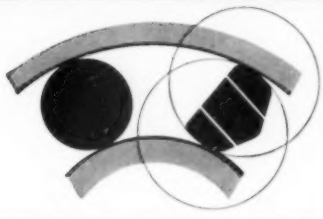


FORMSPRAG CLUTCHES

World's Largest Exclusive Manufacturer of Over-running Clutches

HOW IT WORKS

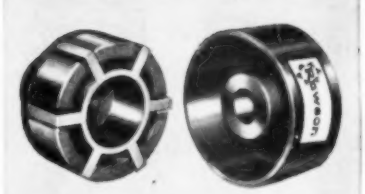




An expanding coil spring keeps the sprags in light contact with both inner and outer races. There is thus no lost motion, the driving torque being instantaneously transmitted between races. The Formsprag Clutch is so designed that it will transmit a greater torque in relation to its size and weight, than any other comparable type of clutch . . . specify Formsprag on over-running, back-stopping and indexing applications.

Forcing a ball or roller into a curved, wedged space is an old over-running clutch principle. The sprag is, in effect, a "roller" of increased diameter with greater contact surface in a given annular space. Formsprag Clutches engage at constantly changing contact points. Clutch life is prolonged and backlash eliminated. Also, with the inclined surfaces discarded, more sprags can be inserted to increase torque capacity.

FOR NO-LOAD STARTS



Specify Rawson Automatic Centrifugal Clutches and Clutch Couplings. They protect the prime mover, eliminate need for costly reduced voltage starting equipment, permit use of less expensive smaller motors to start high inertia loads. Completely automatic and entirely mechanical in operation. Rawson clutches provide full overload protection, never need adjustment. Write for the new Rawson Clutch Catalog now.

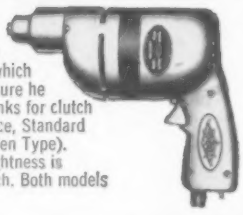
CERTIFIED SIOUX POWER

Electric Drills

SIOUX ELECTRIC SCREWDRIVERS

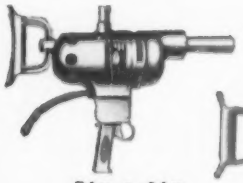
NO. 260 – 262

On No. 260 Super Screwdriver the operator controls the tightness with which a screw is set by the amount of pressure he applies. The ¼" Hex Drive takes shanks for clutch head screwdriver bits, Reed and Prince, Standard screws, Phillips, and socket head (Allen Type). On the No. 262 Super Screwdriver tightness is pre-determined by adjusting the clutch. Both models equipped with reversing switch.

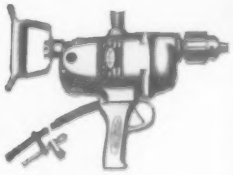


NO. 242

It fits the hand, and operates in restricted space like no other electric screwdriver. It quickly drives or removes all types of screws. No. 242 has a positive clutch; the operator controls the tightness by the amount of pressure applied. No. 246 has an adjustable clutch, so that it can be preset for any uniform degree of tightness desired.

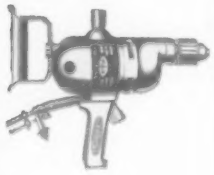


1" H.D. DRILL
No. 1579

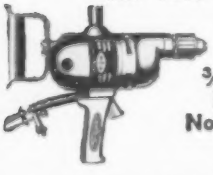


⅜" & ¾"
H.D. DRILLS
No. 1560, 1575

½" H.D. DRILL
No. 1550

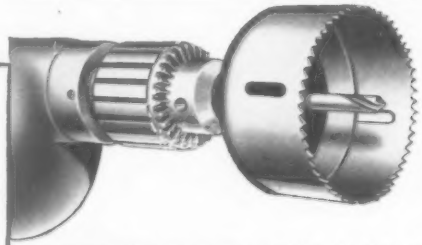


½" STD.
DUTY DRILL
No. 1510



⅜" & 5/16"
H.D. DRILL
No. 1517, 1519

½" SLOW SPEED
DRILL No. 1548



SIOUX HIGH-SPEED STEEL TEETH HOLE SAWS

will cut holes from ⅝" to 6" in diameter, in any free machining material to a depth of 1⅛". Alloy or stainless steel may be cut at slow speed. High-Speed teeth welded to chrome-vanadium body give maximum life and cutting ability.

POWER* SPECIFICATIONS SIOUX ELECTRIC DRILLS

When it's a SIOUX you know what it will do

Catalog Number	No Load Speed	H.P. and R.P.M. at Load Speed		Oz. Ft. Torque at Load Speed	H.P. and R.P.M. at Peak Load Speed		Oz. Ft. Torque Peak Load
1475	2250	5/64	1525	4.9	7/64	1050	8.8
1480	1600	7/64	1140	7.9	5/32	790	16.8
1485	1650	3/32	1060	6.9	1/8	620	16.7
1495	1650	3/32	1060	6.9	1/8	620	16.7
1498	400	3/16	275	45.0	9/32	215	108.0
1510	525	27/64	370	95.0	39/64	230	222.0
1517	925	13/32	670	49.0	9/16	540	135.0
1519	1250	13/32	860	37.5	9/16	500	96.0
1525	1650	5/16	1060	31.0	3/8	680	45.0
1541	925	13/32	670	49.0	9/16	540	85.0
1548	525	27/64	370	95.0	39/64	230	222.0
1550	525	7/16	325	108.0	17/32	175	252.0
1560	400	9/16	260	175.0	3/4	155	400.0
1575	400	3/4	205	308.0	1-1/8	125	748.0
1579	350	49/64	200	315.0	1-9/64	115	800.0
1472	1600	13/64	960	17.8	17/64	720	32.4
1473	950	13/64	575	31.6	17/64	430	55.0
1474	625	13/64	375	44.6	17/64	280	84.2
1477	950	13/64	575	31.6	17/64	430	55.0
1478	625	13/64	375	44.6	17/64	280	84.2
1479	1600	13/64	960	17.8	17/64	720	32.4

*for complete specifications

SEE THE NEW SIOUX CATALOG

when it's a SIOUX

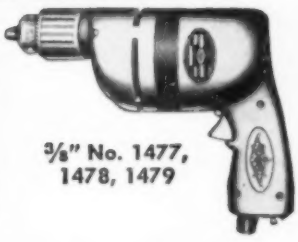
You know what it will do!

The Horsepower and torque for each SIOUX drill is rated, stated, and certified. It isn't necessary to buy just a drill. When it's a SIOUX you know what it will do. See the power specifications for SIOUX Electric Drills in this advertisement.

NEW Super Powered ¼" and ⅜" DRILLS!

Here is super power to provide all the torque necessary for any operation where this type of drill would normally be used. (See specifications) And there's a speed for every need. It's an entirely new design in which the brushes have been located at the fan position at front of the drill. The advantages include cooler running, and easier inspection and replacement of motor brushes without partial or complete disassembly of the tool. Ball and roller bearing construction, with finest precision gears and mechanical design have achieved a new high in output efficiency.

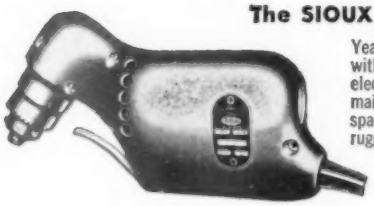
¼" No. 1472, 1473,1474



⅜" No. 1477, 1478, 1479

All time sales champ

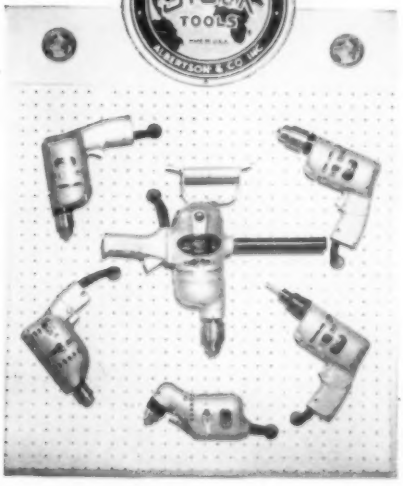
The SIOUX No. 1495 ¼" ALL ANGLE DRILL

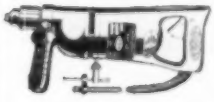


Year after year this is a top seller in the SIOUX line. It's popular with almost everyone—auto mechanic, sheet metal worker, electrician, shipbuilder, woodworker, assembly line, factory maintenance man. It fits the hand and operates in restricted space like no other tool. It's a most convenient handful of rugged power.

Leading distributors everywhere display and sell Certified **SIOUX** *power drills.*

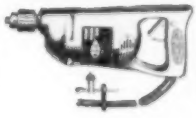
AUTHORIZED SERVICE AND DISTRIBUTORS IN PRINCIPAL CITIES





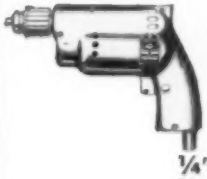
⅜" H.D. DRILL No. 1541

¼" H.D. DRILL No. 1525 BALL BEARING



¼" H.D. DRILL No. 1480 SEMI BALL BEARING

½" LT. DUTY DRILL No. 1498



¼" DRILL No. 1485

¼" DRILL No. 1475

SIOUX

ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U. S. A.

AIR IMPACT WRENCHES • AIR SCREWDRIVERS • "PELICAN" NUT ACCUMULATORS • ELECTRIC IMPACT WRENCHES • DRILLS • GRINDERS • SANDERS • POLISHERS • VALVE FACE GRINDING MACHINES • SCREWDRIVERS • PORTABLE SAWS • FLEXIBLE SHAFTS • ABRASIVE DISCS

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Hall Industrial Water Report

VOLUME 7 APRIL 1959 NUMBER 2

Let's Keep Steamed Up

Large or small, the boiler house is the heart of most industrial plants. It must make steam to maintain production. When there is trouble, production losses from lack of process steam or power may be far more costly than the actual repairs.

Water problems are high on the list of the causes of unscheduled boiler house outages. To minimize these problems, skilled Hall engineers are ready to help you establish a sound, practical water conditioning program. And they can help you with other water problems in cooling systems, process operations and waste disposal.

Spreading Oil on the Water

Due to construction work, a small plant had only one boiler available. Then a fuel oil heater sprung a leak. Suddenly the one boiler had about 200 gallons of oil in it.

Ordinarily the boiler would have been shut down for a complete cleaning. However, that was not considered possible at the time of the accident. Recognizing that he was in real trouble, the engineer called Hall Laboratories.

Fast action was necessary. Most of the oil had to be removed from the boiler without taking it out of service for more than a few hours at night. Hall engineer C. F. Raines fed large quantities of caustic soda and wetting agent while lightly firing the boiler, venting steam to the atmosphere and blowing down heavily. Then the boiler was overflowed through the vent. This took from midnight until 4:00 a.m.

When the boiler was put back on the line at 5:30 a.m., the usual zeolite-treated feedwater was replaced with hard raw water so sludge to absorb oil would be produced in the boiler water. Several days later there was time over a week-end to do a more complete boiling-out job.

In spite of the heavy oil contamination the emergency action kept the boiler in service. Furthermore, when a quick inspection was made after the week-end boil-out there was no evidence of oil on the internal surfaces.

Well Water Changes For the Worse

About three years ago there was a radical change in the well water used by an eastern town. Hardness soared from a constant 8 to 9 gpg to a fluctuating 25 to 40 gpg.

A small local factory had successfully used the softer well water for boiler feedwater by pretreating it with lime and soda ash in a hot-process softener. Trouble came with the new well water because the widely fluctuating, high hardness made adequate control of chemical feeds well-nigh impossible. Calcium carbonate deposition completely plugged the vent condenser on the deaerating heater and stopped a feed pump by causing it to bind.

Hall engineer F. R. Duesing recognized that water conditioning procedures would have to be adjusted to accommodate fluctuating hardness of the feedwater. He therefore used a dispersive to stop the deposition of calcium carbonate in the pre-boiler system. This was the answer. After more than two years' operation there has been no further scale formation on the feed pumps or deaerator vent condenser.

Blowdown was another problem. It was excessively high because of the high solids concentration of the treated well water. By instituting the use of Hagan C-1 Antifoam, Duesing was successful in doubling the normal concentration of dissolved solids in the boiler water without impairment of steam quality. Subsequent inspections of the turbine and boiler superheaters have confirmed that steam quality is good.

Removing Old Scale From Boilers

Scale forms in a boiler in response to specific physical and chemical circumstances. Significant changes in water composition, chemicals used for conditioning, or amounts of chemicals fed can cause the scale to slough off. Accumulation of loosened scale can then upset circulation, obstruct blowdown connections, plug tubes and headers and result in unsafe operation and repairs.

To avoid trouble, a plant with dirty boilers should preferably clean them mechanically or chemically before changing to a more effective water conditioning program. If this is not possible for some reason, such as steam load requiring that all boilers be kept in service, the recommendations of the Hall engineer should be closely followed. He will base his recommendations for establishing desired boiler water conditions on his experience in getting rid of old deposits slowly enough to avoid serious difficulty.

Thermocouples Tell Tube Failure Story

Thermocouples, used to record tube temperatures, were resorted to by a midwest paper mill to warn of scale deposition in the water walls of their boiler. Sludge and sodium aluminum silicate (analcite) scale had caused trouble, and zeolite softening of makeup water didn't stop the analcite. Readings showed tube temperatures went from 450F to over 550F in 60 days.

Hall engineer M. L. Mitchell recommended a newly developed Hagan dispersive which is especially effective in promoting tube rinsing in regions of high heat transfer. The results were dramatic. Tube temperatures leveled off—and when the boiler was next cleaned, continued use kept temperatures at normal levels.

Water is your industry's most important raw material. Use it wisely.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information on how the Hall System can help you solve your particular water problems, write, wire or call address below.

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For more facts Circle 487 on Reader Service Card

What's New

IN STEEL FROM STOCK

New developments will help give you Increased Value in Buying Metals from Ryerson during 1959. Below are just some of the new additions to Ryerson's comprehensive stocks and services.

NEW FASTER MACHINING TUBING... Ledloy® 170—fastest machining steel tubing ever produced, average speed of 170 s.f.m. And only Ryerson has it for shipment from stock. Users report increases of 25% in productivity... longer tool life...improved finish. Sizes available to date from 1" to 2½" O.D. with maximum ⅜" wall thickness.

NOW EVEN FASTER MACHINING LEDLOY BARS... new Ledloy 375 bars boost machinability to record averages of 375 s.f.m. Large stocks of this new steel supplement Ryerson stocks of regular Ledloy 300 free-machining steels to give you widest selection. Available from Ryerson stocks in rounds from ¼" to 1", hexes from ¼" to ⅝".

TWO NEW PLANTS IN TEXAS... the former plants of Vinson Steel and Aluminum Co. in Dallas and Houston are now a part of the Ryerson organization. These plants, already well stocked and equipped, are now backed up by the unequaled facilities of the 18 other Ryerson plants across the nation. This means Texas metal users can now draw on stocks of more than 12,000 kinds, shapes and sizes of steel and aluminum. Also available, full line of industrial plastics and metalworking machinery.

NEW ALUMINUM STOCKS... are being added in Ryerson plants at Cleveland, Philadelphia and Los Angeles. Aluminum stocks at other Ryerson plants have also been greatly expanded.

NEW STOCKS OF T-1 ALLOY PLATES... in two types: to 321 minimum BNH and to firebox quality specs. "321" gives maximum resistance to impact and abrasion. Five sizes available from 3/16" through ⅝". "Firebox" is for applications requiring high strength and toughness...meets ASME code case 1204-3 for pressure vessels. Available in nine sizes from ¼" through 2". Both types offer good weldability.

STAINLESS EXTRUDED ANGLES... now available from Ryerson. They offer better surface and resultant lower polishing costs...cross-section tolerances less than half those of rolled angles for better forming into rings...no increase in price over rolled angles.

INCREASED VALUE IN STAINLESS FROM RYERSON... even though your application may not demand it in every case, you get the ultimate in specification controls when you order stainless from Ryerson—an important increased value without increased cost. Examples: in addition to chemistry specs for Types 304 and 316, you get the added value of controlled mechanical properties and Brinell hardness—and corrosion resistance assured by actual test.

STAINLESS HEADS—NATION'S LARGEST STOCK BY FAR... Ryerson stocks now include every requirement for ASME flanged and dished heads in Types 304, 304L, 316 and 316L in a wide range of gauges and sizes.

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FACTORY . . . PRESS TIME REPORT • APRIL 1959

Looking Ahead in Business

You shouldn't ignore those few soft spots in the business picture today. Yet, in spite of them, U. S. business is now enjoying the banner year we predicted some months ago. This happy state of affairs is likely to continue through 1959.

The index of industrial production is now at 146, compared with 128 a year ago. Gross National Product (GNP) rose to an annual rate of $462-billion for the first quarter of this year—up from $429.2-billion a year ago.

The index should reach 150 by the end of June; GNP, an annual rate of $470-billion. This means business will be operating well above pre-recession highs before summer arrives.

•

Inventory accumulation has been a big factor in the high levels of output experienced so far in 1959. Much of this build-up is a normal aftermath to the record levels of liquidation last year. Business men are rebuilding their stocks to the levels they feel necessary in a growing economy.

But a lot of it is due to the less pleasant prospect of a steel strike. This may well be in the cards when the present wage contracts expire in June. Steel users are now trying to stockpile enough to see them through a 4- to 6-week interruption in steel output if a strike materializes.

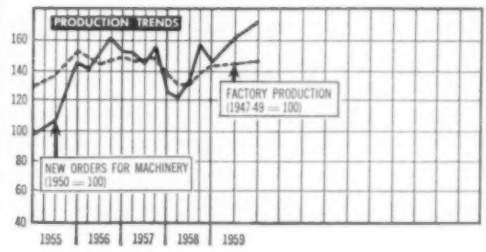
That's why steel operations are nearing peak capacity. The operating rate rose to 90% during March. It should stay above that figure through June.

•

This is much the same pattern as was followed by steel in the months preceding the major strikes in 1952 and 1956. Current feeling is that production is sure to fall back during the third quarter of 1959. Even if there's no strike, steel users will ease ordering until they have depleted some of their emergency inventories.

But steel operations should again approach 90% in the closing months of 1959. That's what happened in 1952 and in 1956. And the recent upturn in capital spending and new-car buying gives reason to believe it will happen again this year.

FACTORY FIGURES OF THE MONTH



Indicator	Feb. 1959[P]	Jan. 1959[r]	Feb. 1958
New Orders for Machinery (exc. elec.)[1]	171.0	161.0	120.0
Contracts for Industrial Construction[2]	128.0	97.0	98.0
Factory Production[3]	146.0	145.0	131.0
Consumers' Prices (cost of living)[4]	123.9	123.8	122.5
Industrial Prices (materials, supplies)[4]	127.7	127.5	125.7
Manufacturing Employment (millions)[5]	15.7	15.7	15.6
Total Employment (millions)[5]	62.7	62.7	62.0
Unemployment (millions)[5]	4.7	4.7	5.2

[P] = preliminary [r] = revised

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Commerce, Bureau of the Census.

But there are some disturbing elements afoot. Chief among these is the persistence of a bothersome degree of unemployment in the midst of continuing and rising prosperity.

Latest reports show a slight rise in the number of unemployed—though there was a rise in total factory employment at the same time. Much of the unemployment is a reflection of increased efficiency that grew out of the cost-cutting inspired by the recession. So it isn't an indication of underlying instability in the economy.

•

There's talk of federal aid to distressed areas where unemployment is a lingering problem. Such a move would reinforce the generally high level of business activity and might very well reduce chronic unemployment in those areas.

But even without such aid, GNP should approach a rate close to $480-billion by year end.

Ideas of the Month

(For more information, circle item numbers on Reader Service Card next to back cover)

Cool blue is just one of six eye-appealing colors now available for asphalt roofs! RE-3 (*King*) is a new aluminum coating that not only *re*colors, but also *re*news roof and *re*flects heat. **(312)**

If miniature parts manufacture is your dish, you'll want to look into those new stereomicroscopes (*Bausch & Lomb*). New concept makes it possible to have continuous flow of magnification. No longer any image "blackout" when changing power. And they cost about a third less than former models. **(313)**

For on-the-run pick-up in narrow aisles, new rider-type sweeper (*Tennant*) travels at speeds up to 5 mph., cleans path 28 in. wide (40 in. with sidebrush). Dual control pedals leave driver's hands free to steer. **(314)**

Your spring mowing will be a breeze with Mow-Mobile (*Jacobsen*), a 37-in. riding rotary machine designed especially for large-expanse cutting. Works equally well on rough, heavy growth or billiard-table-smooth lawns. **(315)**

No industrial relations library is complete without low-cost 253-page report (*U. S. Dept. of Labor*) of 100 health and insurance plans under collective bargaining. Format designed for quick comparisons of features in each plan. Companion piece: digest of 100 pension plans. **(316)**

Protexem Junior is a half-pint-sized vapor-action can (*Wisconsin Labs*) that slips over spray gun nozzle. Keeps spray material dissolved. Protects nozzle during work interruptions, overnight, over weekend. **(317)**

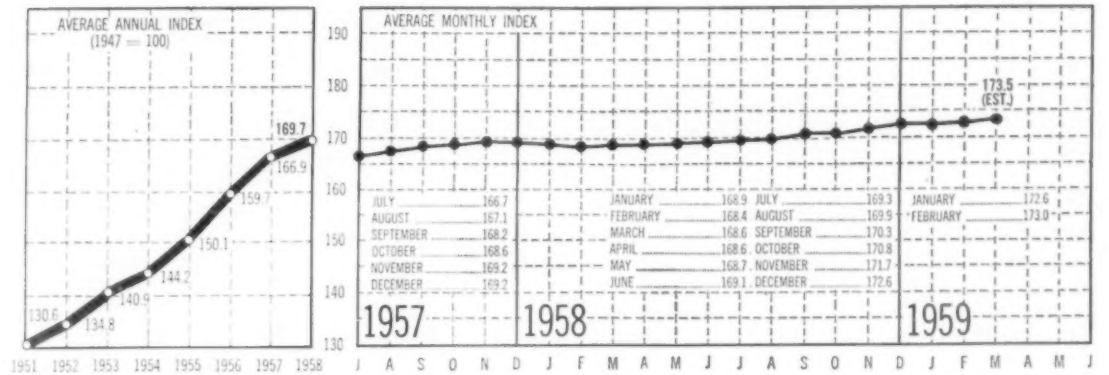
Gotta drill holes in concrete floor? Don't—until you own air hammer (*Thor*) with hollow bit that vacuum-cleans as it drills. Sucks up chips and dust, delivers same to plastic container. **(318)**

Now you can spray anything not currently available in Aerosol cans—with Jet-Pak (*Sprayon*). Just fill container with your own special finish, hook on can of propellant gas, press button—and you're in business. **(319)**

To keep grinding machine operators in straight and narrow, you can hang 12x12 wall charts (*Carborundum*) in toolroom, at tool cribs, on or near machines. They list 10 do's, 10 don't's of grinding wheel safety. **(320)**

More Ideas of the Month on pages 158 and 159

Cost Index of Plant Maintenance



Outlook: Increasing Costs

Push keeps coming from materials costs. Later, labor costs will add a shove.

FACTORY'S Cost Index of plant maintenance continues its upward march. It is now expected to reach a new high mark of 173.5 (1947=100) in March. The 173 attained in February set a new all-time peak in costs, though it was only 0.4 of a percentage point over the January level. February costs averaged 2.7% higher than a year ago.

The current increase over a year ago will widen considerably during the next few months. Last year in the spring months costs stabilized after a short drop because of the recession. But as output moves upward in the months just ahead, the outlook is for increasing costs also.

In February only a few materials prices showed a downward trend. But the cost of a substantial number of materials moved up, fulfilling our prediction made earlier this year. The tally of materials-cost changes during the month is as follows: materials down, 3; up, 15, and even, 21.

Labor costs did not make a sharp gain in February. Chances are good that these will inch up each succeeding month until the steel wage negotiations are settled. After the wage settlement takes place, sharp rises in wages may be expected all along the line.

Steel-consuming companies appear to be expecting a big increase in the cost of steel—or a long strike. It's evident they are buying larger quantities of steel than they are now consuming. This means that a big build-up of steel inventory is underway and will no doubt continue throughout the spring months.

	AVERAGE 1958	FEBRUARY (Preliminary)	JANUARY (Revised)
Building and Facilities Index	160.8	164.7	164.2
Materials	139.2	141.9	141.3
Brick	148.8	151.4	151.4
Elec. fixtures	128.9	127.8	127.8
Elec. switches, boards, fuses	181.5	180.7	180.7
Elec. wire, copper	122.5	134.0	130.6
Glass	152.2	152.0	152.0
Gutters, spouts, ducts	172.9	178.8	178.8
Gypsum products	139.8	140.8	140.8
Heating equipment	127.4	128.1	127.9
Lumber	124.9	129.9	128.1
Millwork	146.9	149.2	149.2
Paint	130.1	130.2	130.0
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	192.0	192.7	192.7
Pipe & tubing, copper	145.7	153.3	150.9
Roofing	120.4	127.3	125.9
Sanitary fixtures	145.0	149.9	147.8
Sash, metal frame trim	146.9	145.2	145.2
Solder	117.5	124.1	121.9
Steel, structural	231.3	236.3	236.3
Tanks, steel	138.4	138.5	138.5
Valves & fittings	160.6	163.8	165.4
Wire mesh	160.8	161.9	161.9
Labor	175.2	179.8	179.5
Carpenters	160.7	165.1	164.6
Electricians	183.5	187.7	187.7
Painters	181.3	186.7	186.2
Equipment Index	173.6	176.6	176.1
Materials	173.5	174.6	174.0
Abrasives	160.3	161.4	160.3
Alloys, non-ferrous	117.2	123.3	121.8
Bars & plate, steel	223.5	227.2	227.2
Bearings	163.4	163.2	160.3
Belting	150.5	155.9	155.9
Bolts, nuts & screws	229.5	225.4	222.5
Chain	184.0	184.0	184.0
Controls (electrical)	181.5	180.7	180.7
Gear-reduction units	181.7	181.7	181.7
Hand tools, mechanics	192.9	197.9	197.9
Lubricants	122.8	123.0	123.0
Motors	147.2	148.0	148.0
Non-ferrous metals	120.9	126.7	128.1
Precision tools	153.2	154.0	153.2
Pumps	184.8	194.7	193.9
Tools, cutting	166.3	168.6	168.1
Valves & fittings	160.6	163.8	165.4
Labor	173.7	177.8	177.6
All mfg. labor	172.2	177.1	177.1
Machine tool labor	175.2	178.8	178.0
FACTORY'S COST INDEX	169.7	173.0	172.6

FACTORY . . . PRESS TIME REPORT • APRIL 1959

Looking Ahead in Labor

You hear a lot of talk about feuds between labor leaders. You read about threats of war between rival labor unions. You see predictions of the imminent bust-up of the AFL-CIO. You hear that one more argument between George Meany and Walter Reuther will blow up the labor federation.

It's time to put these matters in perspective—to know how serious the divisions are and what effects they may have on management.

The answers aren't foolproof. But there are some clear details to put these arguments in perspective. They were evident recently when AFL-CIO officials met in Puerto Rico. Here are three predictions:

•

Prediction 1: No bust-up of the AFL-CIO.

Federation President Meany and UAW President Reuther tangled over how unions should publicize labor's unemployment troubles. Reuther wanted a dramatic 25,000-worker "March on Washington." Meany favored a toned-down union conference.

Actually, they argue over many things. Though they evolved the AFL-CIO merger three years ago, their ideas conflict more than coincide. They are personality opposites. They are not friends. But they do respect each other.

This, combined with the fact that they need each other, makes a split-up unlikely. Meany needs Reuther's old CIO unions. Reuther needs Meany's Federation and its merged labor platform for his programs. Their conflicts notwithstanding, they'll be out to preserve labor unity.

•

Prediction 2: No all-out war between the AFL-CIO and the Teamsters Union.

In San Juan the Federation set up an organizing rival to the island's trucking union. It's AFL-CIO's first direct challenge in trucking. Why? It's strong in Puerto Rico. The Teamsters aren't.

This challenge is safe. But Meany and company know it would be suicide to tangle with the Teamsters on the mainland.

Prediction 3: The craft-industrial union feuds will continue to give off sparks.

But not enough sparks to divide the union movement again. The division has existed for 30 years—and continued when AFL and CIO merged. Yet despite eruptions and scrapping for jobs, these unions have bridged the gap. The private dealings in San Juan showed that the worst is over. They're now willing to deal over the conference table, rather than scrap in the picket line.

•

Top union topic of today—and tomorrow—is the shorter workweek. It's not a new subject. But for the first time it has priority for the AFL-CIO's 140 unions. The reason is unemployment.

The solution: Carve out more jobs. Trimming the 40-hour week to 38, 36, or 32 would mean more jobs for the same production. The approach will be along two lines: bargaining and legislation.

Where it has chances of success, the demand will be served up in bargaining. Top examples are the spring negotiations of United Steelworkers and United Rubber Workers. They mean business on at least a moderate trimming of working hours.

Other unions, such as Reuther's UAW, will be pushing for legislation. The shorter workweek drive lost out in last year's auto negotiations. Now Reuther will seek the same thing through legislation. The AFL-CIO demand to Congress is a 5-hour cut in the 40-hour week.

•

Prospects in Congress for this year are nil. Union leaders know this—they're just beginning the softening-up process. By promoting such legislation, they keep the issue alive before the public.

At the negotiating table, the outlook is better. If the steel union can crack the door open, just a fraction, on the shorter workweek, it will be all the breakthrough the unions need. They already have less-than-40-hour weeks in a number of industries—such as printing, brewery, garment, and others. But they still need a strong push in big industry to go all the way.

SEE LABOR RELATIONS NEWS, PAGE 196

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FACTORY . . . OPINION

New Light on Productivity

Two articles in this issue deal with productivity. That alone makes it an important issue, because many vital problems are associated with productivity today.

The first article (page 246) deals directly with the subject—"What Every Operating Man Should Know About Productivity." It explains how statisticians measure national figures, what the figures mean, what the trend has been. It gives suggestions for computing productivity figures for the individual plant.

This article's principal conclusion:

Productivity, defined as output per man-hour, has risen at a better-than-average rate since World War II. But no records have been broken, despite talk about the "age of automation." Authorities point out that output per man-hour rose as much over the same period of time in the pre-war past.

We think this conclusion will startle many operating men, certainly any who are inclined to think that mechanization automatically boosts output per man-hour. It does not, of course. Much mechanization aims wholly or partly at quality improvement, or achievement of tolerances beyond human skill levels. We know of no way in which productivity statistics can reflect this kind of situation.

Also we know of no way (except checking as we did) by which statistics can reflect changes in the make-up of the manufacturing labor force. We have to assume that changes in output per man-hour involve the same *kinds* of man-hours. Yet if we make this assumption, we can be very wrong. The man-hour "mix" today has a substantially bigger percentage of white-collar workers in it than even 10 years ago. At that time about 16% of the manufacturing people were white-collar. Now the figure is about 23%, or close to one worker in every four. In the same post-war period blue-collar employment has stayed practically level.

So it's pretty clear that productivity statistics don't tell the whole story. You have to dig under them to get that. Yet it still makes sense to ask why even the incomplete story doesn't show a better record of results for the many billions of dollars we've been spending on new plants and equipment.

We think we have the answer—tied directly in with our own recurring theme of "Managed Modernization at Work," which you will see in every issue of FACTORY this year. The answer is that much of the forward progress made by highly productive new facilities tends to be offset by the drag of the large number of obsolete and outmoded facilities that are still in use. Our McGraw-Hill Economics Department, for example, cites a recent survey that shows need for another $35-billion to be spent on modernization. So . . .

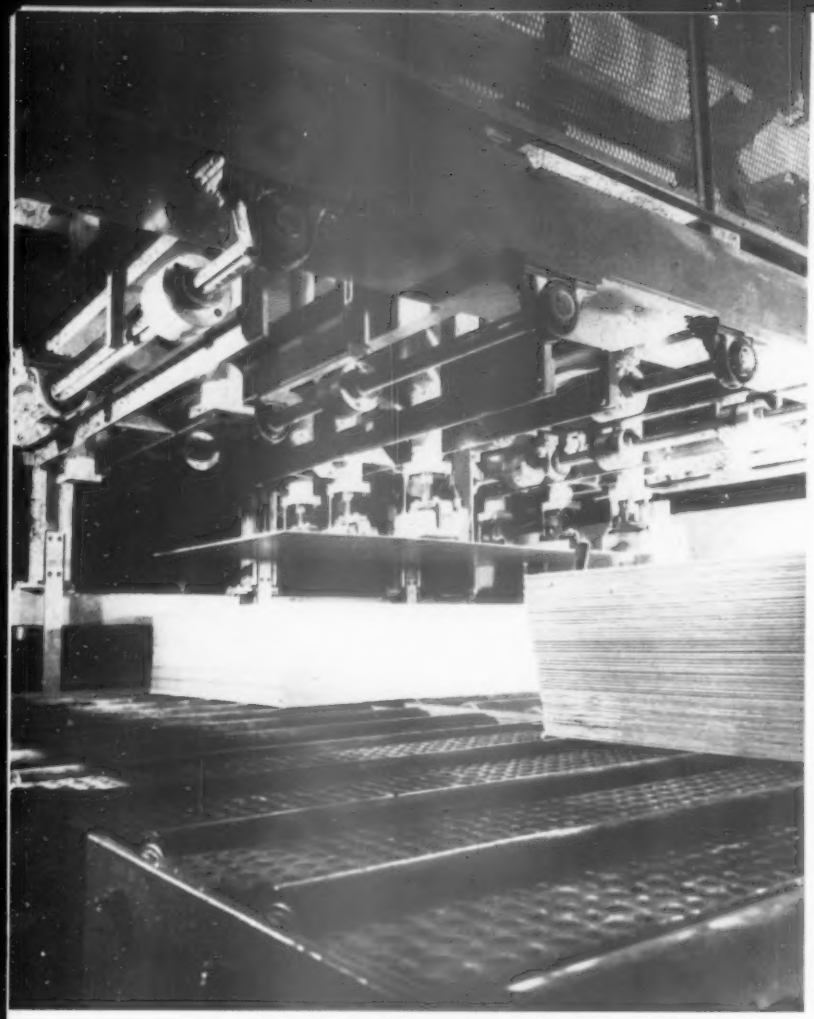
There's a big modernizing job still ahead before we can reap the full benefits of all we've done so far in building and equipping new plants.

But that's not the only job. The second article we mentioned at the start of this editorial points up another aspect of productivity that's not given much attention these days—the individual worker's personal effort and output. The article reports on FACTORY's major survey of work measurement and wage incentives (page 74).

The reason there's little talk about what the individual worker can do is that mechanization generally makes his job physically easier rather than harder. Yet our survey shows that American industry is still vitally concerned with improving personal productivity on these physically easier jobs. Figures show that 60% of all plants use some form of work measurement and 51% use some form of wage incentive.

These figures, too, may surprise many readers. Most of those with whom we've talked about the survey results have guessed figures that were much lower. But now that we've seen the data, our own forecast is that there will be a steady upward trend in the use of work measurement and wage incentives. It's obvious that these activities are paying off in the great majority of cases. It's also clear that they fill a real need—that motivating individual workers to higher personal output is an important factor in improving productivity. To put it another way:

The machine isn't yet all-powerful. Improved human effort is still an extremely important factor in the productivity picture.



1. Clumsy handling eased with magnets

These steel sheets are automatically handled, automatically made into transformer tanks. Magnetic destacker feeds individual sheets to conveyor leading to punchpress, which makes small hole as position reference for later operations. Sheet is stenciled with style number, rolled to cylindrical shape. Cylinders feed end-to-end into side-seam welder, then through grinding station to remove inches off weldment at each end. Breakoff arm separates continuously welded shells into units. Shells come in five diameters. Lengths vary from 20 to 48 inches.

MANAGED MODERNIZATION At Work

Everywhere You Look, It's

Heavy, clumsy, fragile, ordinary—whatever it is, it gets automatic handling in this plant. Why? Because management planned modern—all the way.

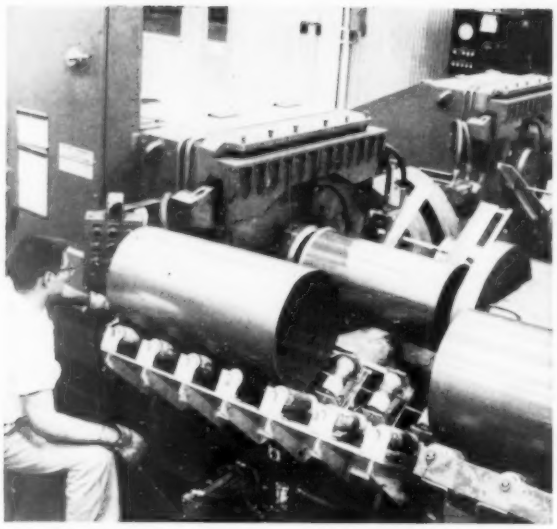
"A LOT OF EQUIPMENT here. But darn few people." That's what you'll think when you tour Westinghouse's new transformer plant at Athens, Ga. (Or when you look at the photos on these six pages.)

You're right. Manufacturing covers 560,000 square feet including a 21,000-sq.-ft. balcony over the coil-winding area. But total employment, including production workers, is only slightly over 400.

Ingenious management planning for standard and specialized handling equipment is the key. There just isn't any manual handling of anything that weighs more than a few pounds. And most moves of bulky transformer cans, heavy cores, delicate coils, and complex assembled units are semi-automatic if not completely automatic. Result: integrated handling from start to finish.

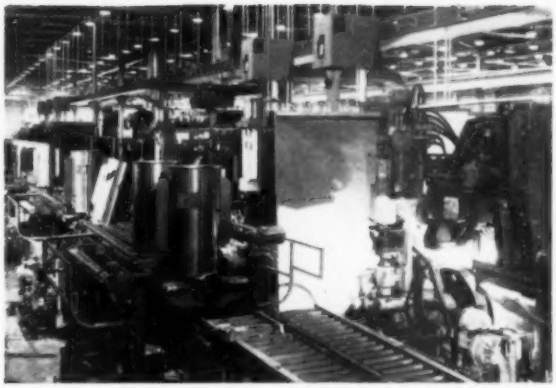
Conveyor footage totals about 5 miles. There are in-floor tow lines, overhead monorails, power-and-free units, and standard gravity runs, as well as conveyorized storage racks. Specialized transfer units shuttle components and finished transformers between different conveyors that service successive work centers. Another species of transfer devices feeds, orients, and removes parts at production stations. Even at quality checkpoints, automatic and semi-automatic handlers move parts through predetermined test sequences. Then the test data are recorded automatically.

Straight-line flow of materials in the plant's three major fabrication areas increases handling efficiency, too. And to take advantage of even greater handling economies in the core and coil lines, Westinghouse redesigned both these units. The new designs, in addition to simplify-



2. Finishing touches put on tank

Selector sends tank shells down gravity conveyors to either of two automatic welding and beading machines. (The one in rear is not being used here.) These operations complete forming, ready the tanks for welding. After a positioner tilts each shell 90 degrees to an upright position in center, shell moves on roller conveyor to the first of eight welders and two punchpresses—all automatic. To carry out the next 10 operations successfully, Westinghouse did everything possible to standardize tank design, was able to eliminate 44% of the variables.



3. Ten jobs—no hands needed

Ten operating stations here, but where are the men? Tanks move in and out of stations automatically. Automatic positioners with cam tracks check radial and longitudinal locations. Static controls sequence tanks while up to 32 accessories (fed by magazines, vibrators, belts) are secured to inner and outer walls. Even the bottom goes on automatically. Along the way each tank is leak-tested and pushed off on a repair spur if it's faulty. In addition, it's turned upside down and back to its original position by two automatic 180-deg. turnover devices.

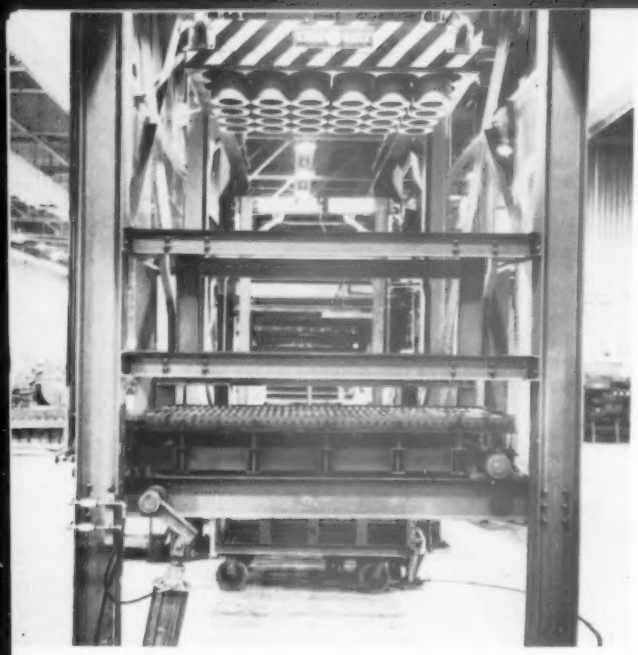
No-Hands Handling

ing the manufacturing processes, also offer improved performance characteristics and reliability.

Perhaps the most highly mechanized fabrication operations are those that handle the bulky transformer tanks (photos). This line integrates 15 major machines with 10 automatic positioners, 2 automatic turnovers, and over 500 feet of powered roller conveyors. The equipment performs 55 separate operations in assembling up to 32 different pieces and punching 7 holes. This automatic line is flexible, too—makes 385 style combinations.

4. Tanks exiled to the rafters

Overhead storage takes care of completed tanks and covers until needed in final assembly. From assembly line tanks transfer to overhead paint conveyor, take 8-hr. trip through overhead cleaning and painting. On return, elevator transfers tanks to overhead storage. When needed, tanks return to floor level, are put on another overhead conveyor by a second elevator transfer, moved to final assembly. TelAutograph telescriber tells handler what model final assembly needs.



MANAGED MODERNIZATION At Work

1. Twelve cores lifted at once

A special electromagnet (the size of a basketball backboard) on this bridge crane loads and unloads an entire batch of cores in one move. Thus one annealing operator takes care of all handling at the furnace, too. Cores come to this annealing furnace on an in-floor towline conveyor. The electromagnet transfers them from the towline truck to a stainless steel tray for a 182-ft. ride through the furnace. At the far end an automatic elevator raises the tray load to a return conveyor over the furnace. Once back at the starting point, the electromagnet shuttles the cores to the roller conveyor (foreground) leading to test and storage areas.

Begins on page 62

Heavy Handling Is Light Work

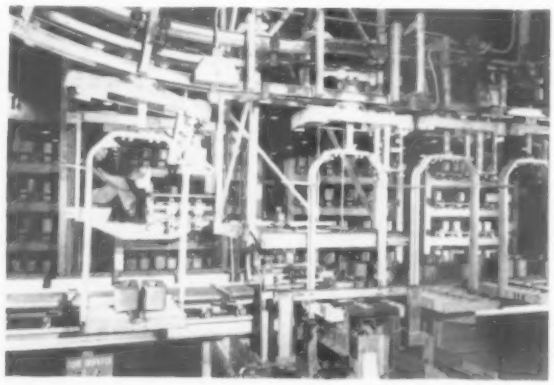
DESIGN of the new cores went hand in glove with planning of production facilities at Westinghouse-Athens. The result: manual core handling—even within individual operations—is now a thing of the past.

The first operation on this line (slitting large coils to proper width) is a one-man operation. Similarly, at the core-winding machine all the operator does is watch after he loads and threads the coil stock. As the constant-tension core is wound, a steering roll and shifting recoiler align edges. This eliminates any need for side guides.

Two hydraulic units automatically remove wound cores, start them down a roller conveyor to succeeding operations. Likewise, with hydraulic transfer table, machine operator can load heavy coils of raw steel on the feed end of this machine without additional help.

2. Cores transferred to storage

They call this transfer the "flying carpet." It moves up and down and all around the 24-ft.-long, multi-level core storage racks. It transfers up to 16 cores per load from roller conveyor (foreground) to proper rack slot. To load carrier, operator lines his conveyorized platform up with conveyor rollers. This disengages stops at end of conveyor (they'll engage again when he pulls away). Cores roll onto transfer car. At rack, cores roll off into slightly inclined storage units.



3. Cores taken out, too

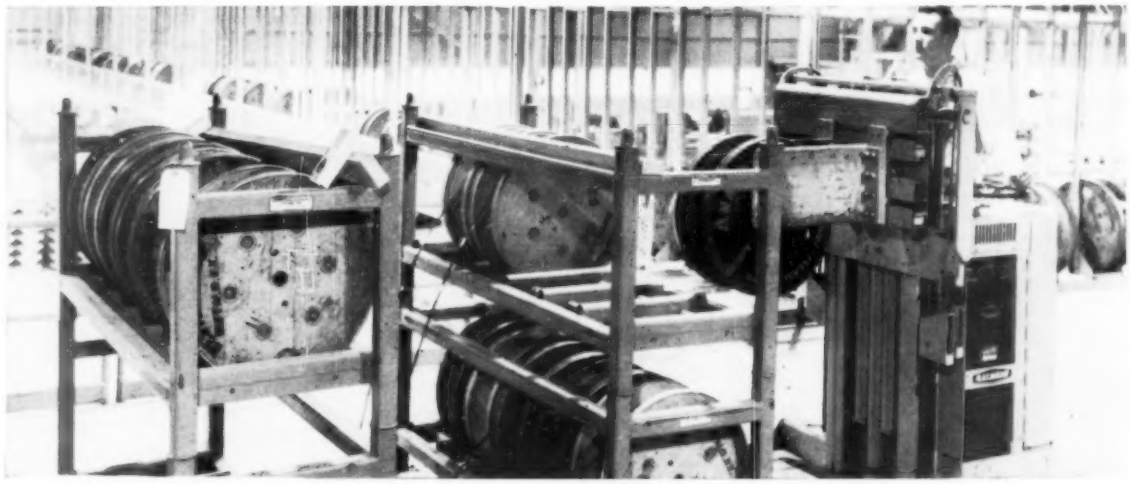
Here's the "flying carpet" again—at other end of the racks. It takes cores from the 150-rack storage positions, transfers them to roll-top dollies, which ride a closed-circuit power conveyor. From dollies, cores go in pairs to power-and-free conveyor (foreground) serving final assembly. At transfer point, hydraulic cylinder raises a set of rollers that fit into carrier's platform slots. Pneumatic cylinder pushes cores from dolly onto carrier. Rollers retract, leaving cores on carrier.

Fragile Coils Get Tender Touch

SUPPLIES FROM ABOVE is the secret weapon in the coil-winding area of Westinghouse's new plant. It's made possible by a 21,000-sq.-ft. balcony built over 24 winding machines. From here rack-stored rectangular wire for low-voltage coils feeds down through slots in the floor. Getting these reels out of the way gives the winding machines an uncluttered look.

The winding department boasts major improvements in winding as well as in handling. For the first time, specially designed machines are winding high- and low-voltage coil sections progressively.

Purchased copper used in coils is finally processed in an area not far from the coil-winding machines. When processing is completed, the copper is packed in 250- and 500-lb. drums and taken to the balcony supply conveyor loading station. This overhead conveyor, with specially designed carriers, stores the wire until it's needed.



1. Operations supplied from storage balcony overhead

This is the 21,000-sq.-ft. balcony storage area. It saves space on the main floor, reduces congestion around coil-winding machines. One man using a specially designed truck can keep 24 machines on main floor supplied with rectangular wire.

Overhead conveyor (background) with its 425 special carriers brings reels from main floor. Its 825-ft. path travels around perimeter of the balcony. Moving at 8 fpm., it also serves as a live storage bank for drums until wire is needed.

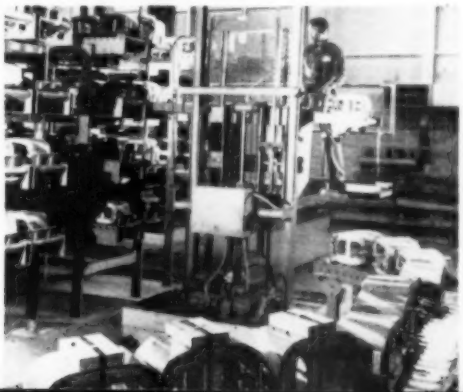
When the handler wants a certain type of wire, he takes the reel from the conveyor, places it in the correct two-level rack. Slots in floor at each rack feed wire down to machine easily. With rollers in each rack slot, reels unwind smoothly.

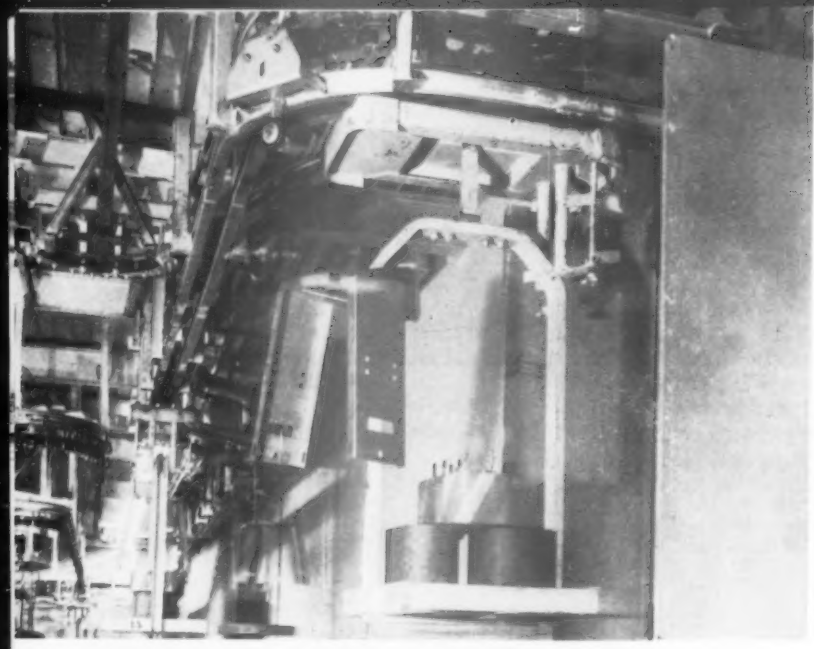
2. Coils wound six at once

Special coil winders (look like lathes) wind five or six coils at once. Rectangular wire (from above) and round wire (from racks behind machines) are tensioned and traversed. Turns are counted during winding. Completed coils ride to test on towline trucks, which also bring supplies.

3. Coils shuttled to storage

After finished coils have been inspected, this gravity conveyor brings them to storage area. A track-mounted truck with a roller platform transfers them to the storage racks (photo below). The truck travels laterally as well as vertically. At the other end of these racks a similar truck removes the stored coils and sends them on to baking and dehydrating operations. The racks hold a week's supply of finished coils.





MANAGED MODERNIZATION At Work

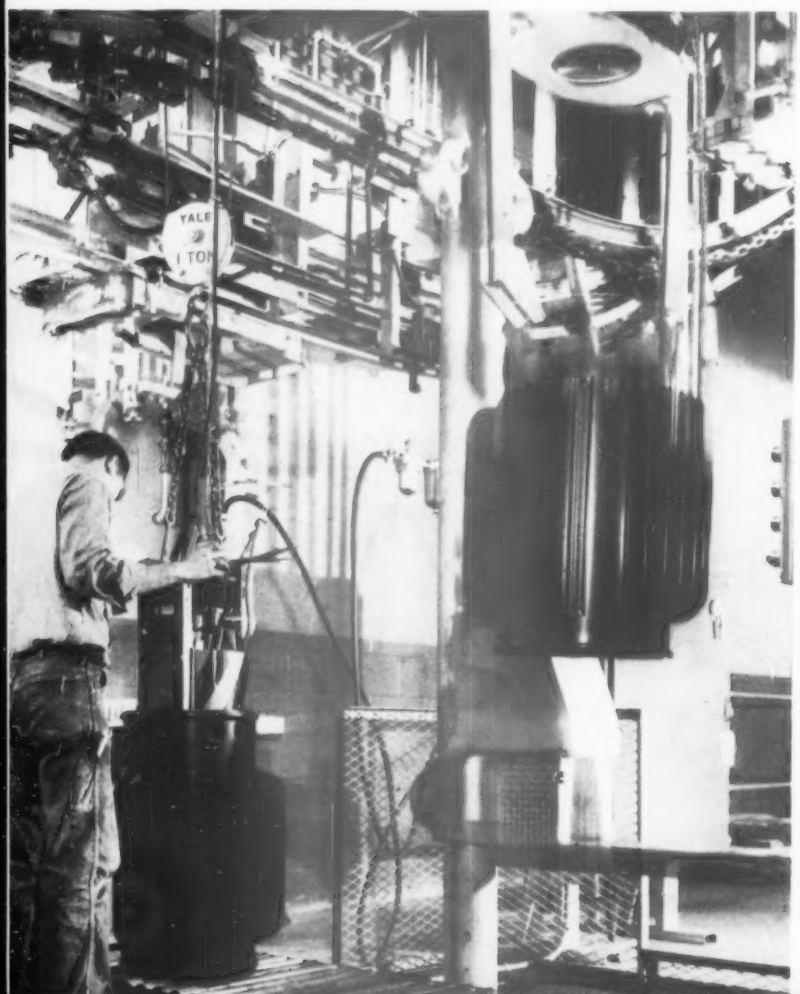
Begins on page 62

Whatever

ROUGHLY 1700 FEET of power-and-free conveyors, 24 automatic switches, 5 powered elevators, 14 special lift devices, and an automatic test wheel speed final transformer assembly. The two primary conveyor systems include 11 conveyors

1. Doors opened for coils and cores

Automatic doors admit cores and coil to humidity-controlled assembly area. Recirculating conveyor loop force-feeds six lines. Cores and coil are assembled at Lazy-Susan platforms with mechanical arms. Flags route carriers to right station. Carrier moves assemblies to second loop, which feeds two lines where accessories are added. Completed units are inspected, sent to storage float to await tanking.



2. Right tank dropped for every unit

Through assembly-room ceiling powered elevator drops tank to match available core-coil assembly. It's done with aid of TelAutograph telescriber. Automatic door admits the units so conditions in controlled room won't be affected.

After operator unloads tank from carrier, he uses hoist to drop the core-coil assembly in place. After bolting coil-core assembly in place, operator loads complete assembly on carrier. Same carrier stays with unit until it is tested.

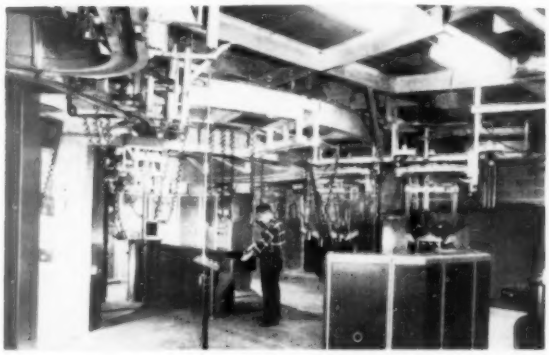
Another switch transfers the unit to the "fit-for-test" assembly, where high- and low-voltage bushings and cover are added. At final assembly station, transformer is evacuated to residual pressure, filled with dehydrated and degassed oil, sent to the test area outside the humidity-controlled room.

It Is, This System Handles It

that deliver coils and cores to assembly in a humidity-controlled room. Then take coil-core combinations through final assembly and test stations before delivering finished units to crating and shipping.

The conveyor system is the heart of a continuous assembly line with paced speeds and forced feeds. It requires careful scheduling and matching of components.

Preparation for final assembly begins when two cores are automatically loaded on power-and-free carrier. The right model coil is added, along with end frame, as carrier passes coil storage area. Carrier heads for humidity-controlled room for final assembly operations. When fully assembled, transformer emerges for testing, final packing.



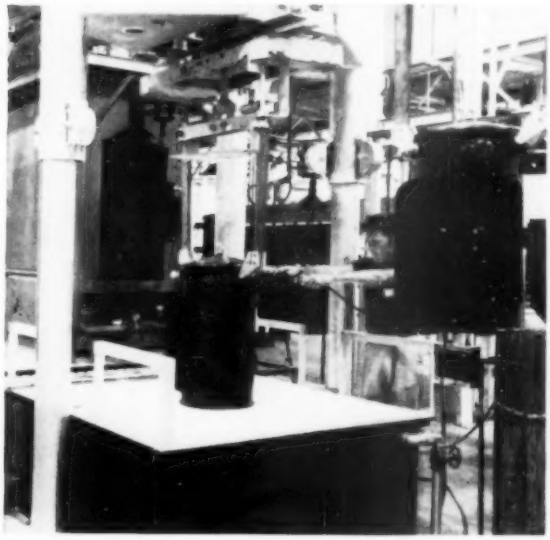
3. Units spun on carrousel

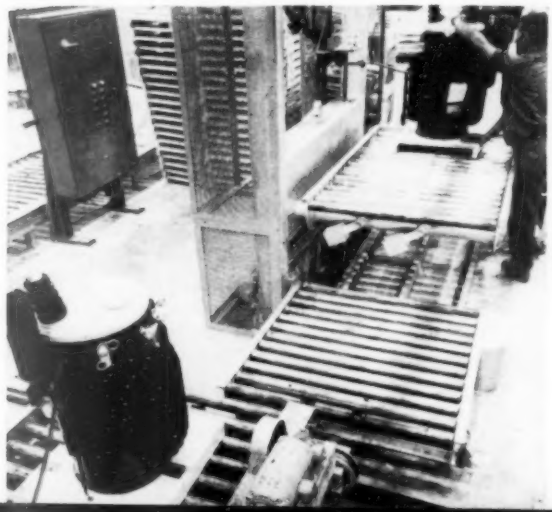
Nine electrical tests take place on this 30-ft.-diameter, carrousel-like conveyor. Inspector just attaches and detaches test leads. Punched cards program the tests and index the conveyor. If unit fails the test, it's automatically shorted out so the succeeding test won't injure it. Test results are recorded on same punched card used for programing.

Rotating conveyor wheel is supported from overhead, handles units up to 1500 pounds. Wheel has 14 loading stations where automatic devices lock carriers in position. Part of line is enclosed in acoustical tunnel for sound-level testing.

4. Leaks revealed in water bath

This 6-ft.-deep lighted water tank checks completed transformers for leaks. Air pressure applied internally sends up bubbles if there's a weakness in eye-bolt cover assembly or cover and bushing baskets. Two elevators side by side lower and raise tanks. First elevator lowers the tank into the bath and lifts tanks from underwater test chamber. At same time, second elevator unloads tested transformer and returns its carrier to overhead storage float of power-and-free conveyor. Overhead monorail takes transformers to succeeding operations.





5. Finished product set to go

Section of roller conveyor in shipping rises so worker can place finished unit directly on shipping pallet. Transformers have just come from paint touch-up. After they're strapped to the pallets for "crateless" shipping, they roll onto a transfer car. This routes them to one of two shipping conveyors.

Profit Report Yields . . .

XYZ COMPANY

Profit & Loss Statement
Year Ended December 31, 1959

Gross sales		$1,860,000
Less returns & allowances		60,000
NET SALES		1,800,000
COST OF MANUFACTURING		
Direct labor	**360,000**	
Direct material	**540,000**	
Manufacturing overhead	**234,000**	
TOTAL COST OF MANUFACTURING		**1,134,000**
GROSS PROFIT		666,000
OPERATING EXPENSES		
Selling expense	216,000	
Administrative expense	144,000	
General expenses	108,000	
TOTAL OPERATING EXPENSE		468,000
OPERATING PROFIT		198,000
Other income	5,000	
Other expense	3,000	
Net profit (before federal income tax)		200,000
Federal income tax		104,000
NET PROFIT		96,000

Cost Breakdown . . .

DIRECT LABOR

Regular time
O/T
Bonuses
Taxes
Fringe
Total Direct Labor

DIRECT MATERIAL

Opening inventories	
Raw material	$ 92,000
Work in process	188,000
Finished product	290,000
Total Opening Inventories	$570,000
Purchases	$520,000
Less: Closing inventories	
Raw material	$ 90,000
Work in process	190,000
Finished product	270,000
Total Closing Inventories	$550,000
Total Direct Material Consumed	$540,000

MANUFACTURING OVERHEAD

Indirect labor
Supervision
Idle time
Inspection
Other non-productive labor
Total Indirect Labor

Indirect material
Fuel
Light, power & water
Supplies
Small tools
Total Indirect Material

General
Maintenance & repairs, building
Maintenance & repairs, machine & equipment
Depreciation
Rent
Taxes & insurance
Total General Expenses
Total Manufacturing Overhead
Total Cost of Manufacturing

Do big-money figures (above) mystify you? Then break 'em into little pieces (above right, and facing page). You'll find new opportunities for . . .

Pinpointing Soft Spots in Costs

DON'T LET ANYBODY tell you you can't pinpoint the reports you need for controlling and cutting cost in your plant. The basic tool is a profit-and-loss statement, like the one shown above (left). In this example, direct material costs are 48% ($540,000 ÷ $1,134,000 = 48%)

By DONALD HOODES, Director
Management Advisory Service
Profit Counselors, Inc., New York

of the total cost of manufacture (bold-face type).

What does this tell you? It tells you that you can afford to spend time and money to find out more about material costs. It tells you to investigate the cost-savings potential in direct material before you invest time or money in fact-gathering for control of direct labor or manufacturing burden.

The profit-and-loss statement above is exploded in two steps. The first explosion (right-hand table) shows how labor, material, and factory overhead expenses (burden) can be broken down into rough elements for analysis. The second explosion (facing page) shows the detailed cost breakdowns you can make and relates them to the cost action you can take if they're out of line. They are your cost-cutting tools.

Turn the page

for Closer Control of Plant Operations

DIRECT LABOR

MOST SIGNIFICANT RATIOS

1. Direct Labor $ as a % of sales
2. D. L. $ as a % of cost of mfg.
3. D. L. $ per finished unit
4. D. L. $ to plant capacity %

CONTROL AND COST-CUTTING TOOLS	TOOL EVALUATIONS
A. Methods Improvement	1. Man-hours per operation 2. D. L. $ per operation 3. No. units per operation 4. No. units per D. L. $
B. Plant Layout	1. Time in process per unit 2. Distance traveled per unit 3. Department and work station capacity rates to flow rates 4. Temporary storage inventory
C. Production Planning and Scheduling	1. % of idle time per unit 2. O/T $ per unit 3. Set-up cost per unit 4. Machine downtime cost per unit 5. % of orders converted into finished units 6. % of orders made into shipments
D. Organization	
Sales Coordination	1. See 5 above 2. See 6 above
Supervision	1. Ratio of supervisors to employees 2. Ratio of supervision cost to D. L. cost
Incentives	1. D. L. $ per unit 2. Man-hours per unit 3. Work station unit production
Personnel Programs	1. Labor turnover % 2. Man-days lost 3. Union relations (good—bad) 4. Training program (good—bad)
E. Design and Engineering	
Product Machine Tool	1. D. L. $ as a % of sales 2. D. L. $ as a % of cost of mfg. 3. D. L. $ per finished unit
F. Accounting and Control Accuracy Correct Classification (Direct, Indirect Labor & Supv.)	Common "plant sense" evaluation of all accounting reports by controller, plant manager, and general manager.

DIRECT MATERIAL

MOST SIGNIFICANT RATIOS

1. Direct Material $ as % of sales
2. D. M. $ as % of mfg. cost
3. D. M. $ per finished unit
4. D. M. $ to plant capacity %

CONTROL AND COST-CUTTING TOOLS (Cont.)	TOOL EVALUATIONS (Cont.)
A. Purchasing Efforts	1. Ratio of material received to material consumed 2. Ratio of P.O. $ issued to supply $ delivered 3. Purchased material inventory
B. Quality Control	1. % of rejects 2. % of customer complaints
C. Design and Engineering	
Experimental	See Material, D
Samples	See Material, D
Redesign	See Direct Labor, E
D. Value Analysis	1. D. M. $ as % of sales 2. D. M. $ as % of mfg. cost 3. D. M. $ per finished unit
E. Inventory Control	
Raw Material	1. Amount on hand in production days 2. Supplier's lead time in production days
Work-in-Process	1. Ratio of work-in-process to finished inventory
Finished Product	1. Ratio of current production to current sales 2. Ratio of current sales to current shipments
F. Accounting Effort Accuracy Correct Classification (Direct, Indirect Material, etc.)	Common "plant sense" evaluation of all reports by controller, purchasing agent, plant manager, and general manager

MANUFACTURING OVERHEAD

MOST SIGNIFICANT RATIOS

1. Manufacturing Overhead $ as % of sales
2. M.O. $ as % of mfg. cost
3. M.O. $ per finished unit
4. M.O. $ to plant capacity %

INDIRECT LABOR	
Organization	See Direct Labor, D—"Incentives"
Plant Layout	See D.L., B
Methods Impr.	See D.L., A
Production Planning and Scheduling	See D.L., C
Organization	See D.L., D—Incentives, Personnel
Material Handling	See D.L., B
Organization	See D.L., D—Purchasing
Quality Control	See D.M., 2
INDIRECT MATERIAL	
Methods Impr.	See D.L., A
Plant Engineering	Machine Downtime
Production Planning and Scheduling	See D.L., C
Purchasing	See D.M., A

GENERAL

Plant Engineering	Machine Downtime %
Methods Impr.	See D.L., A
Preventive Mtce.	Machine Downtime %
Product Design and Engineering	See D.L., E
Plant Layout	See D.L., B
Organization	See D.L., D

How Management Can Make

CONDITIONS		SALES			PRODUCTION DATA			MANUFACTURING		
		Sales Orders ($1000's)	Order Backlog ($1000's)	Shipments ($1000's)	Production ($1000's)	Capacity	Material Purchase Orders Issued ($1000's)	Direct Material ($1000's)	Direct Labor ($1000's)	INVENTORIES Raw Material ($1000's)
Ideal	Mgt. A	$150	$225	$150	$150	100%	$45	$45	$30	$135
Average	Mgt. A	100	150	100	100	66⅔%	30	30	20	90
Sales Falling	Mgt. B Mo. 1	50	Start 150 End 100	100	100	66⅔%	30	30	20	Start 90 End 90
	Mgt. C Mo. 1	50	Start 150 End 100	100	75	50%	—	—	15	Start 90 End 67.5
	Mgt. B Mo. 2	50	Start 100 End 100	50 (a)	75	50%	22.5 (b)	30 (c)	18 (d)	Start 90 End 97.5 (e)
	Mgt. C Mo. 2	50	Start 100 End 100	50	50	33⅓%	—	—	10	Start 67.5 End 52.5
Sales Rising	Mgt. D Mo. 1	150	Start 150 End 200	100	100 (i)	66⅔%	50 (j)	30	20	Start 90 End 90
	Mgt. D Mo. 2	250	Start 200 End 350 (k)	100	100	66⅔%	50	50 (l)	20	Start 90 End 110
	Mgt. D Mo. 3	100	Start 350 End 325 200M Cancelled (m)	125 (n)	125 (o)	83⅓%	50 (p)	50	25	Start 110 End 122.5
	Mgt. D Mo. 4	50 (q)	Start 125 End 75 (r)	100	150 (s)	100%	30 (t)	50 (u)	30	Start 122.5 End 127.5 (v)
	Mgt. D Mo. 5	50	Start 75 End 75	50	100	66⅔%	—	50	20	Start 127.5 End 147.5
	Mgt. D Mo. 6	50	Start 75 End 75	50	50	33⅓%	—	50	10	Start 147.5 End 182.5

Begins on page 68

BREAKDOWNS WANTED

In the example (p. 68), direct material is the biggest single element of cost in the profit-and-loss statement. The right-hand table (same page) breaks it down further.

The figures tell these things:

• The opening and closing inventory figures match fairly well. So this month was not unusual. If inventory of work-in-process had been twice as large at month's end ($376,000) as at the beginning, the month would not be representative. The manager would want immediately to find out what caused the in-process inventory to double.

• Purchases almost matched material used, so purchasing is meeting manufacturing requirements.

• Raw material inventories are small compared to other elements. So it makes no sense to get additional facts about raw material inventory until you have studied in-process and finished goods inventories, and purchases. You can't afford to take purchasing and accounting—and your own operating staff—hunting for sparrows when there's a woods full of turkeys.

(If you're beginning to resist on the theory you can't get cost data, consider this: Here at Profit Counselors, Inc., we've worked with hundreds of small plants. We've found cost data are available in 95% of plants with 100 or more employees.

or Break a Company

COST ELEMENTS					CURRENT FINANCIAL FACTORS		
INVENTORIES		MFG. O'HEAD		GROSS PROFIT			
Work in Process ($1000's)	Finished Product ($1000's)	Fixed ($1000's)	Var. ($1000's)	($1000's)	Cash ($1000's)	Net Quick Assets ($1000's)	Net Working Capital ($1000's)
$75	$150	$10	$4.5	$60.5	$150	$125	$383
50	100	10	3	37	100	40	205
50 50	100 100	10	3	37	Start 100 End 100	40	205
50 50	100 75	10	2.25	37.75	Start 100 End 135	105	235
50 50	100 125 (f)	10	3 (g)	9	Start 100 End 40 (h)	20	165
50 50	75 75	8	1.5	16.5	Start 135 End 115	85	200
50 50	100 100	10	3	37	Start 100 End 100	40	205
50 50	100 100	10	3	37	Start 100 End 80	0	185
50 50	100 100	10	3.75	48.75	Start 80 End 67.5	125	210
50 50	100 150 (w)	10	4.5	35.5	Start 67.5 End 62.5	17.5	185
50 50	150 200	10	3	12	Start 62.5 End 17.5	113.5	160
50 50	200 150	10	1.5	11.5	Start 17.5 End 17.5	147.5	135

Often the data are not reported to plant management in detail. But the way the source information is gathered makes preparation of reports inexpensive.)

TYING DATA TO ACTION

It's now time to work to cut costs. The detailed breakdown on page 69 shows the tools you can use and the data you can get to evaluate the effectiveness of control and cost-cutting. There are some over-all evaluation points, too. You can compute the $540,000 monthly bill as a per cent of sales (first over-all evaluation point). This will tell if sales fluctuations are quickly reflected in purchasing. If the monthly percentages vary widely, the manager's efforts to control material costs aren't working. Communication between sales and purchasing could be the problem.

In the example, quality control might be installed, with the objective of reducing material costs by cutting scrap. Quality control can be evaluated by a monthly report of per cent of rejects and per cent of complaints.

GETTING FACTS YOU NEED

Many of the facts you need can be generated in your own operation. Distance traveled per unit, for example, is a figure manufacturing can develop. There's no need to get other departments into the act. And any operating man knows it's easier to generate information within his own department than to get other departments to supply it.

But there's one problem, even in reports generated by manufacturing. Every report increases manufacturing overhead. And top management is especially critical of the overhead figure. So the operating manager must be able to justify the expense of fact-gathering.

You can generate lots of facts within your own organization, but many must come from other departments—accounting, purchasing, sales, engineering. This is bad news. Most operating managers have had run-ins with other departments over reports. Accountants want to keep their work simple, regardless of the effect in the shop. FACTORY's chief editor had this fine advice on the subject (February 1959, p. 61):

- Stop sniping at those important lump-sum figures from accounting. True, they don't give you all you need, but they're useful.
- Make sure you really know what you want. Accountants have their gripes, too. Their biggest is that operating men ask for data they don't need and can't use.
- Make a real effort to work with your accounting people, enlist their help. Explaining cost problems and asking for help can work wonders. The average operating man will benefit from an improved knowledge of accounting.

TAKING THE BIG LOOK

If you've concluded the controller is an important man in your plant operating life, you're right. He can be a big help—or a severe hindrance. But he's not the only one who can stick pins in your operating balloon. The sales manager has an even more powerful influence on operating

policy. If his forecast is off—or slow in following a trend—the result will be felt in plant operation. And his opinion on pricing can turn the cost-reduction screws tight enough to make the most hardened operating man wince.

Take this little drama:

Harry Jones is plant manager of a small screw manufacturing company. He's up to his ears in the day-to-day grind of converting materials and man-hours into finished products. All of a sudden, up pops one of those meetings where Topnoggin brings together the production, sales, and financial boys for an over-all review of operations. The discussion focuses on the industry-wide profit squeeze. The controller reports that volume should rise on the basis of sales forecasts but that company net, at best, will just about hold even. Increased material, labor, and distribution costs are the problem, he says. The sales manager adds: "We can't pass on these increased costs in a price hike if we want to remain competitive in business."

Before Harry can rationalize his position, Topnoggin turns to him and says: "Harry, the answer has to come from you. We've got to improve our profit margin. To do it, we'll have to cut our cost of manufacturing down to the muscle."

Most plant operating managers fare poorly in discussions of this kind. Many go on the defensive right away. They hammer out dozens of reasons why costs can't be cut any more. Others take their hat and leave the meeting as quickly as they can. Neither way is good.

What's needed is a broad knowledge of company affairs.

The last decade has seen a vast change in the concept of manufacturing management. The changes result from advances in technology, marketing, and products. A "good production man" is no longer good enough to be a plant manager. The plant manager today has to be much more. The job requires a man who knows what he's doing—and what the other guy is doing as well. He has to know and understand the cause-and-effect relationship of every function. What happens in sales, purchasing, inventories, shipping, and finance directly affects him.

The plant manager's ability to plan and control his company's investment in material, labor, and equipment has a vital effect on the financial results of the over-all operation. The big company, with its decentralized operation, realizes the economics role played by the plant manager. Often his earnings are based on the return he produces on operating and capital investment under his control. Few small-plant managements have yet accepted this kind of thinking. They have not developed the over-all plant concept needed to operate more efficiently. Nor have they developed the plant men needed to make it work.

Planning and forecasting techniques, for example, are used effectively by big plants. But lots of small plant operators think they're too expensive. And here's a paradox. Big plants have accepted the inherent advantages of small-plant operation and have decentralized manufacturing operations as much as possible. The result: a number of small plants run autonomously. The methods these larger companies have developed can be adopted successfully by the small plant.

CHARTING ECONOMICS

The chart on pages 70-71 demonstrates the interdependence of all business functions. The necessity for coordinating them becomes obvious as the chart tells its story.

The elements that make up the chart exist in any business. But the several segments of the management team know about them piece by piece. The plant manager, for example, knows his capacity and production figures. The sales manager knows what his backlog and current sales are. The controller knows how much cash is on hand, net working capital, and available assets. Only one man has a grasp of the entire picture—Topnoggin. And he's so busy changing hats he can't control or coordinate the over-all operation.

The chart is a simplified picture of what can happen to any business in periods of sales downtrends and uptrends. It tells the story of a typical small company under ideal and average operating conditions (Management A). Then it tells what happens to the company under Management B (poor) and Management C (good) during a two-month sales downtrend. Finally, it tells of the company under Management D (poor) during a six-month sales uptrend.

How Management A operates—Look at the top line on the chart. It tells the story of Company A when it's operating under ideal conditions. It expects $150,000 in sales orders during the month. Its backlog of orders amounts to $225,000. It's operating a three-shift operation at 100% capacity.

The plant will issue $45,000 in purchase orders (using a 90-day lead time) and receive $45,000 worth of direct material (material used in the product made for sale.) Inventories will hold fairly constant at $135,000, $75,000 and $150,000. Fixed factory overhead is $10,000 (rent, taxes on property and equipment, and salaries for key employees who wouldn't be let go regardless of production volume). Variable overhead includes maintenance, janitorial and production-supporting labor, and supplies that can vary with production volume. Gross profit here totals $60,000. Net quick is all assets that could be converted to cash quickly, less current liabilities. To get net quick, you add cash and accounts receivable, then subtract accounts payable and other current liabilities. Net working capital is net quick plus inventories (all current assets less all current liabilities).

The second line of the chart is more typical of Company A's operation. Instead of operating at 100% of capacity, it operates at 66⅔%. Gross profit at this level of operation is $37,000.

How Managements B and C operate—The chief difference between Management B (poor) and Management C (good) is their speed and thoroughness in meeting change in business conditions. The well-managed company gets accurate sales forecasts early enough to make manufacturing cutbacks. And the company cuts back its direct labor,

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material purchases, and other variable expenses as fast as it cuts production. The poorly managed company moves slowly, stalls off reductions in labor purchases and other expenses. The result for Management B, in just two months, is a red net quick figure. The company doesn't have enough cash and receivables to meet its current payables and other liabilities. Management C uses foresight, doesn't get into this sort of trouble.

The following points are keyed to the small letters in the chart:

(a) Sales shipments are shown as $50,000 for this month. Because of the declining market, some of the customers who had placed orders (for the $100,000 order backlog) postponed delivery. Therefore only $50,000 could be shipped during the month. The order backlog started at $100,000 and ended at $100,000. This company's customers were feeling the pinch of slack demand in their own markets.

(b) Material purchase orders issued for the month total $22,500. More should have been issued. Poor purchase control and coordination is the reason for the error. More detailed analysis of future raw material requirements and a better knowledge of suppliers would have helped. Normally, as the economy turns down, lead time can be cut.

(c) Orders placed for this material should have been either canceled or postponed.

(d) For direct labor Management B spent $18,000 in this period. If direct labor was variable with the amount of production, this figure should have been $15,000.

(e) An ending inventory of $97,500 in raw material was caused by purchase of material in excess of needs during the month.

(f) Low shipments plus over-production increased the finished goods inventory to an ending value of $125,000.

(g) Variable manufacturing overhead was not reduced in proportion to production.

(h) Cash has dwindled to $40,000. The excess cash investment made in material and labor, the over-investment in inventory, and slower accounts receivable collections were responsible. Here's where the controller gets nervous. And, in the last block, net quick is a red figure. The company's receivables and cash don't cover payables.

How Management D operates—Now see what happens to Management D (poor) during a sales uptrend. Again, follow the letters on the chart:

(i) As backlog goes up, current production cannot be increased fast enough to meet the change.

(j) Material purchase orders are issued for $50,000 worth of supplies, based on the sales department's forecast. Purchasing department should have been informed of the limitations in production, and should have used the information to reduce purchase orders.

(k) Another increase in the order backlog occurs because of production and shipment problems.

(l) Direct material costs for this period are $50,000, but only $30,000 worth of raw material is used. This is because of purchase orders that were placed 90 days previously, plus other orders placed in anticipation of higher sales and production volumes.

(m) Because the company cannot increase production and shipments, customers cancel a total $200,000 worth of orders.

(n & o) Shipments and production are finally raised 25%.

(p) In spite of the above $200,000 sales cancellations, heavy purchase orders continue. Inventory control is not properly related to current sales.

(q) The company cannot deliver goods on time, so its customers lose enthusiasm for it and its sales force becomes demoralized.

(r) Sales backlog drops with reduced sales and increased shipments.

(s) Production finally gets geared up to 100% capacity after the need is past.

(t) Months too late. The purchasing department reduces its raw material purchase orders.

(u) Heavy shipments of direct material are still being received, in spite of the low sales, production, and shipment levels.

(v & w) Ending inventories of this month are unbalanced. Considerable over-investment in inventory is evident.

Coming in May FACTORY . . .

The Top Plants of 1959

It's the Silver Jubilee (25th year) of FACTORY's nationwide competition for awards as pacesetters in plant design and construction.

In more than 100 idea-packed pages of feature articles you'll find . . .

- **The Ten Top Plants of 1959—selected as winners by FACTORY's editors—pictured in full color from original watercolor paintings.**
- **Eight full pages of specifications for building and equipping the winning plants.**
- **Site selection techniques that management men used to locate their winning plants.**
- **Over 20 pages on how the Ten Top Plants got set for efficiency in production, maintenance, electrical services, materials handling, and management development.**
- **The most significant trends in design and construction over the past quarter century.**

What FACTORY's Editors Conclude About

. . . WHERE INCENTIVES STAND NOW

1. Incentives are here to stay. A few plants (4%) plan to discontinue incentives. But a slightly larger number (5%) intend to install them. Of those that now have them, 96% say they'll keep them.

2. Predetermined time standards systems are gaining ground. Work Factor, MTM, BMT, and others are in 29% of the plants using work measurement. A dozen years ago there were only a handful.

3. Basic problems cry for research. Serious problems —administrative, technical, human relations—remain much as they were 25 years ago. We need new concepts, new approaches. Too much research effort bypasses the big problems, picks at the small ones.

. . . WHAT'S WRONG WITH INCENTIVES

1. Nothing is basically wrong. Not everyone agrees this is so. But the great majority in decision-making spots believe the incentive principle is as sound today as it was 50 years ago. Details need fixing. But the structure is still good—for those who *want* to use wage incentives in their plants.

2. Administration is lax. Incentives are like watches. They won't stand up under neglect or abuse. All authorities agree that incentives need dedicated administration to keep them working well. They're doomed to failure if administration relaxes its efforts—ignores job changes that affect the standard, winks at misapplication of standards. And so on. The drops accumulate quickly into a pool of disorder. When this happens management is in real trouble.

3. There's too much "fire-fighting." Plant operations are dynamic. They change. Incentive administration can't stand still with static practices and procedures. It must change to fit changing needs. But in most plants, fighting the daily fires that break out in incentives leaves too little administrative time to think about the basic problems, let alone act on them. Fire-fighting goes on and on. Fire prevention seldom starts. Yet prevention is the place where real effort pays off.

The Truth About Wage Incentives

This is the survey you've been waiting for. It will tell you how management men in 785 plants see these controversial tools—how they use them—what the gains (and pitfalls) are—what's needed to make them work better.

LOOKING for an argument? Just throw work measurement and wage incentives at a group of plant operating men. You'll get your argument.

How come? Because differences of opinion on work measurement and wage incentives are sharp. One plant executive, for example, tells us: "We don't believe we could operate at a profit without an incentive plan." Another says: "We had a lot of trouble with our incentives. So we took 'em out—all of 'em." Another reason for argument about these two management tools: Facts are scarce.

What are the facts? Now, for the first time anywhere, you'll find them—right here in this 11-page report. It marshals the facts that are revealed in an exclusive FACTORY survey—conceived, managed, analyzed, and carefully edited by Industrial Production Editor Robert S. Rice.

This searching report will fill a long-standing need among plant men. We know this is true because in recent years we've had hundreds of requests for these very facts. Our most recent requests have come from some of the 785 management men who painstakingly filled out FACTORY's probing questionnaire (and to whom we now say, "Thanks for your wonderful help").

Truth is, FACTORY made two surveys. A short form asked only eight easy questions. Chief purpose: to find how widely work measurement and wage incentives are used. A separate, independent long-form survey asked 37 questions—many of them hard to answer. It, too, counted the plants using work measurement and wage incentives.

WHAT THE SURVEYS SHOW

The table below shows how many plants gave useful answers to the questions—and how many of them use one, both, or neither of these management tools:

	No. of Plants	% of Plants		
		Total	Short-form	Long-form
Work measurement	469	60%	61%	59%
Work incentives	399	51%	54%	49%
Both	315	40%	42%	39%
Neither	231	29%	26%	31%
Work measurement only	154	20%	19%	20%
Wage incentives only	84	11%	12%	10%
Total plants (base)		785	274	511

These Management Tools Today

. . . WHAT THE PROBLEMS ARE

1. Inequities in standards filter in. Many time standards stand out because they're wrong—too loose. Tight standards quickly get changed upward. Inequities and complaints result. How did standards get that way? Some started life too loose. Creeping changes got the rest—changes that went unnoticed accidentally, even deliberately.

2. Coverage isn't broad enough. Some jobs don't get measured for incentive application. Others are beyond common practical measuring techniques. Covered jobs pay an average 28% more than uncovered jobs. And that leads to troubles.

3. People work at cross-purposes. Where there's agreement among all concerned—management, employees, union—on an incentive, it works well. But this is a rare case. Usually there are dissenters, and they can be present in any of the three factions. An incentive plan presents many opportunities to slip monkey-wrenches into the gears.

. . . WHAT'S AHEAD IN INCENTIVES

1. Today's problems will be around for a while. There seem to be no universal solutions to the problems around the next corner. Generally, plant management feels it will hold most of the best in incentives, will make some progress on the problems. But the immediate years ahead for incentives look about the same as those just past.

2. You'll see better measuring techniques. There's a real market for them. About 72% say there's a great need for better techniques to set standards on hard-to-measure work. Usually, when a market gap appears, a new product is not far behind. In fact, promising new techniques have appeared already.

3. There'll be new types of plans. One plant in eight recently has adopted a new incentive plan designed to fit mechanized operations. Another 29% think new types of plans are needed. Will the new plans be panaceas? No. But there's no doubt they will be improvements.

and Work Measurement Today

Correlation in the preceding table seems too good to be true. But there was no fudging. The important figures are these: 60% of all plants use work measurement; 51% have wage incentives for non-management employees.

Industry-to-industry variants—This next table shows the "have" and "have-not" data by major classifications:

	% of Plants that have		
Industry	. . . Work Measurement	. . . Wage Incentives	Bases
Ordnance	86%	0%	7
Food	31	27	49
Tobacco	100	67	3
Textile	86	89	28
Apparel	66	89	38
Lumber, wood	22	33	9
Furniture, fixtures	60	73	15
Paper, pulp	49	46	39
Printing, publishing	30	30	20
Chemicals	31	14	58
Petroleum	0	0	13
Rubber	64	68	22
Leather	50	87	16
Stone, clay, glass	56	66	32
Primary metals	55	57	49
Fabricated metal products	75	55	101
Machinery (exc. electrical)	64	42	118
Electrical machinery	81	60	88
Transportation equipment	63	37	35
Instruments	64	50	22
Misc. manufacturing	70	78	23
	60%	51%	785

This table reveals that some industries—apparel and leather are outstanding—use wage incentives more than work measurement. Two reasons for this quirk:

1. Many plants still set up incentive bogies on some basis other than work measurement.

2. Some plants may have confused work measurement with measured day work, a labor-performance control plan minus the incentive payment feature.

Big plants and small—Size is significant. This final table shows a steady increase in work measurement and wage incentives from small to large plants:

	% of Plants That Have . . .		Bases
No. of Employees	. . . Work Measurement	. . . Wage Incentives	Total No. Plants
Up to 99	40%	20%	5
100 to 249	47	45	88
250 to 499	53	45	312
500 to 999	65	52	215
1000 to 2500	69	63	114
Over 2500	82	69	51
	60%	51%	785

Why the increase from small to large plants?

1. Many of the smaller plants are process plants, where these management tools are not used much.

2. Many more of the smaller plants are job shops. In general, management of these plants believes work measurement isn't practical for job-shop work.

The basic problem of measuring non-repetitive work crops up many times in the survey. It appears to be the No. 1 challenge to work measurement engineers.

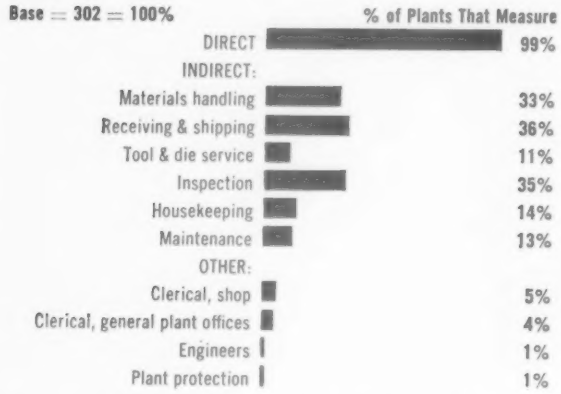
Turn the page

Begins on page 74

From plants across the nation comes a new FACTORY survey:

How Plant Management Men See Work

1. What categories of employees are covered by work measurement?



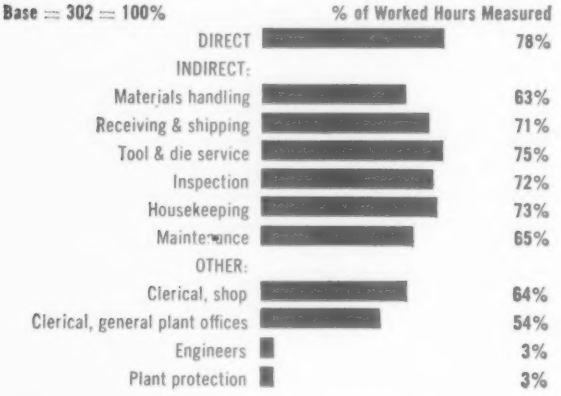
Too little measurement of indirect work.

All but one of the plants reporting on work measurement say they measure direct production labor. The exception is a chemical plant. But note how few plants report measurement of indirect work. Indirect functions shown above are common to all plants (except tool and die service). But when we relate measurement of this work to the metalworking plants, the percentage of plants that have and measure tool and die service is still under 30%.

There's a well-established trend toward a higher ratio of indirect to direct labor. If this is true of manufacturing in general, then it's true of the majority of plants. That means it's on its way to you if you haven't already noticed the change in your plant. Now if work measurement is to continue to be a useful tool for the control of production and costs, its application to indirect work has to increase.

There's another reason. Continuous cost reduction is as necessary in a plant today as is, say, supervision. You can't live without it. And competitive cost cutting is now reaching into the indirect functions. If work measurement really is a good tool for cutting costs, its application to indirect work is sure to come. In fact, that's where substantial rewards are likely to be.

2. What is coverage of worked hours?



Too much work is left unmeasured.

Two-thirds of 25% extra performance is 17%. An incentive may look good in terms of performance on standard work. But doing non-covered work cuts a worker's bonus. Also unmeasured jobs probably will show high cost. Why? It's a common shop trick to shift time charges from measured to unmeasured work. Also assignment of non-incentive work causes grousing. Finally the average-earnings plan for unmeasured work crops up. Unmeasured work hurts work-measurement effectiveness, especially if there's an incentive plan. Coverage is a top problem in work measurement.

3. Are you changing your coverage?

	% of Plants Changing Coverage			
	Past 3 years			Will Increase Next Year
Base = 302 = 100%	Increased	No Change	Decreased	
DIRECT	60%	34%	6%	45%
INDIRECT:				
Materials handling	63%	33%	4%	48%
Receiving & shipping	45%	52%	3%	29%
Tool & die service	35%	54%	11%	24%
Inspection	48%	43%	9%	39%
Housekeeping	55%	42%	3%	36%
Maintenance	42%	55%	3%	31%
OTHER:				
Clerical, shop	38%	62%	0%	13%
Clerical, general plant offices	33%	67%	0%	46%
Engineers	100%	0%	0%	33%
Plant protection	0%	100%	0%	0%

High coverage of work with standards is still a long way in the future.

On the basis of where coverage stands these days, the progress it has made in the past, and the changes management men see in the next year, prospects for higher coverage aren't bright.

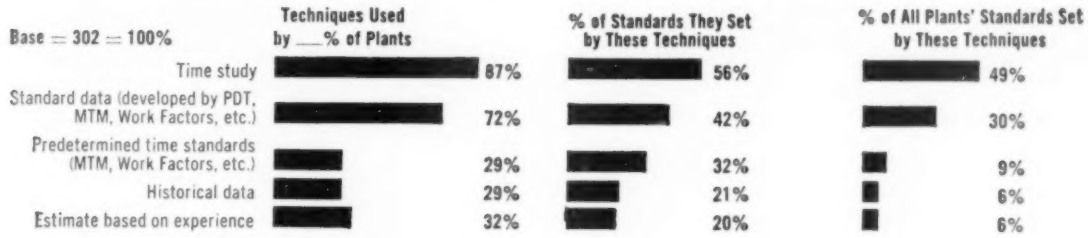
The chart shows that in all but one category of work

Measurement and Wage Incentives

(office-clerical) fewer plants are planning to extend their coverage than have shown increased coverage in the past. Does this mean plants are approaching the saturation point for coverage?

True, much of the unmeasured work represents "tough nuts"—areas that are hard to measure. But the data from the survey indicate that this is a problem that needs serious attention.

4. How are time standards set? And what per cent of them is set by each technique?



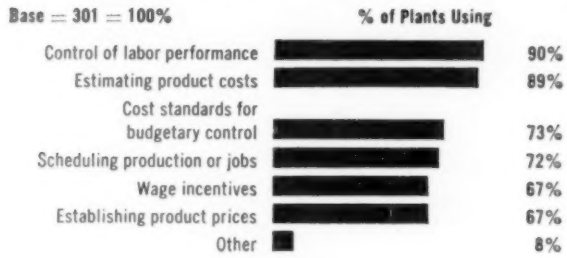
Predetermined time standards are gaining.

In September 1953 FACTORY surveyed uses of PTS systems (Work Factor, MTM, BMT, etc.). We found then that 46% of the plants that used the systems were checking time standards with them. This new survey shows that less than 10% of plants using PTS use it to check standards. More are now setting some standards with PTS. It seems confidence is improving. Though the percentage of standards set by PTS is low, we predict it will double in under 5 years.

Work measurement specialists have long seen standard data as the ideal way to set standards. The technique has been in the literature for a generation. Yet only 72% of the plants surveyed use the method. And these plants set less than half (42%) of their standards in this ideal way.

Use of past records and estimates is still significant. But this practice is generally limited to plants using work measurement without having wage incentives. The percentage of standards set this way is small—and we believe it's getting smaller.

5. For what purposes do you use standards?

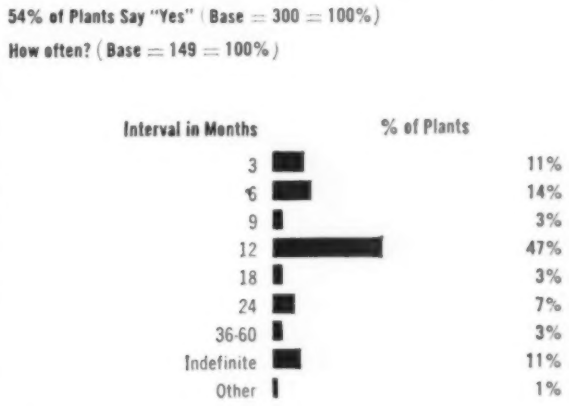


Uses of time standards in plants are just about what you'd expect them to be.

Every plant uses its time standards for more than one purpose. Average number of uses per plant is between four and five. Surprising note in the data in the chart is that 10% of plants did not check use of time standards for control of labor performance.

Most popular uses among "others" include machine replacement calculation, manning schedules, and plant layout.

6. Do you review standards periodically?



There's too little auditing of applications.

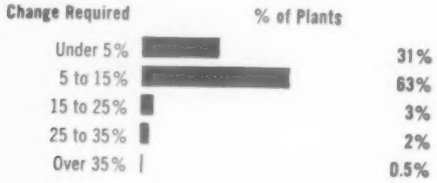
Plants are about equally divided on auditing standards application. (A *bona fide* audit is an on-the-spot check of the accuracy of standards; unrecognized changes in standard conditions on which the standards are pred-

icated, accuracy of application of standards, etc. Without occasional auditing, a work measurement application could develop flaws that might not be detected by other means.)

Frequency of auditing ranges widely. But nearly half the plants that audit do it annually. The 1% "other" includes two plants. One audits "seasonally"; the other when job lots repeat.

7. How much must a change in conditions affect a standard for you to revise it?

Base = 255 = 100%



Policy on changing standards is loose.

About 85% of the plants gave specific answers to this question. The rest said they had no regular policy. More than two-thirds of the plants don't change a standard unless the new conditions affect it by more than 5%. At least half said 10% or more.

This may be all right where work measurement is used as a control, and not for incentives. But looseness in changing incentive standards leads to loose standards. Gradually inequities build up to the point where many people begin to wonder if the plan is worth its trouble.

8. When you change standards, do you . . .

	% of Plants
. . . change completely?	31%
. . . change only part?	76%
. . . do both?	7%

Base = 301 = 100%

Changing only the affected part of the standard is becoming common practice.

The choice is between (1) changing that part of the standard time affected by the method or job-condition change and (2) setting a completely new standard. With incentives, the first procedure is almost universal. It assures workers of no time change without reason—and makes changes simpler, faster. But this latter is true only if the standard is built up of time values for each of the job elements—and the record of the standard proves it. The practice requires detailed standards and precise records of materials, methods, and job conditions as well as time. One advantage of PTS is its automatic record of method details.

One respondent dissents to the no-change-without-reason policy. He writes:

"Best way to handle standards changes is to change them. If you use the word 'standard' you imply measurement of a factor to a degree of accuracy. If you find it inaccurate within the variation allowed, you just have to change it. If you don't, it can't be a standard. Too many men say, 'If it was wrong originally (or after so many days) it must stay wrong.' That's a hopeless outlook."

Changing a standard is one thing. But it's another thing to cut incentive pay arbitrarily by changing a wrong standard. Our respondent above has a point. Wrong standards plague work measurement and incentives.

Can this problem be better handled with a new concept? Can we approach changes in standards by separating the conflicting elements of time and money?

Maintenance of accuracy in standards is a key problem. It should be worth some research.

9. How do you measure indirect work?

Base = 165 = 100%

	% of Plants
Direct standards	49%
Ratio to production workers	48%
Other methods	7%
Two methods	4%

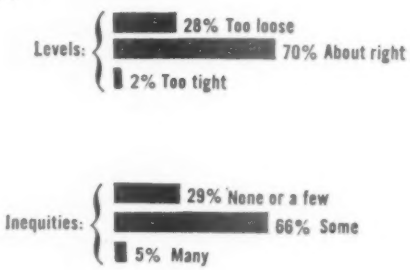
There's a clear swing to direct measurement of indirect work.

Half the plants measure indirect work with standards for the work performed. The other half, roughly, relate performance of indirect workers to the production operations they serve. We have no data to prove it. But it seems likely there's a strong upward trend in direct measurement.

Indirect work is growing in cost significance. Probably this is why many plants are trying to measure service work more exactly. (A later question treats this from the incentive standpoint.) Nearly all the "other methods" mention work sampling (ratio-delay). This fairly new way to measure non-repetitive work appears to be catching on.

10. How do you rate standards accuracy as to average levels? As to inequities?

Base = 290 = 100%



Standards aren't accurate.

More than one plant in four has loose standards. To make matters worse, the levels of looseness aren't uniform within themselves. Nearly three plants in four have "some" or more inequitable standards—standards

that are significantly more loose than the average of all standards. Those are the facts the survey reveals.

How'd they get that way? There are several specific reasons. But these reasons generally relate to the same thing—prime consideration of the employee-relations aspect of administering work-measurement applications. Again, as in replies to some questions above, these data point up the urgent need for better ways to deal with inaccurate standards and with the changes in conditions that create many of them.

The 2% of the plants that claim their standards are "too tight" are not using these standards for wage incentives. That should be obvious.

11. How many employees are performing standards work in your plant?

No. employees in plant	% Employees in Standards Work		
	Min.	Aver.	Max.
Up to 99	*	1.82%	*
100 to 249	2.3%	1.22	25.0%
250 to 499	2.4	0.94	31.0
500 to 999	1.3	0.74	22.9
1000 to 2500	1.0	0.70	18.8
Over 2500	1.1	0.41	17.1

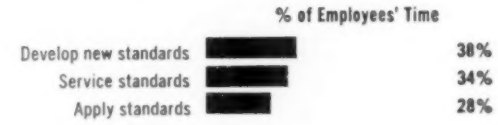
*One plant

This may account for the fact that few smaller plants use work measurement.

According to the data returned in the survey answers, the salary cost of maintaining work measurement in a small plant is about three times that of a large plant. Application savings have to be bigger, proportionately, to compensate. This does not imply, of course, that work measurement won't help a small plant cut costs—despite the relatively higher application cost.

The ranges run wide, as might be expected. Excepting the smallest plant size (under 100 employees) the averages represent substantial numbers of plants—enough to justify use of the averages for your own comparisons.

12. How do employees who perform standards work in your plant use their time?



There may be a waste of talent here.

We can't be positive about this conclusion. The data don't cover the titles and descriptions of positions that perform these duties. But the 28% of time spent applying standards to shop work looks suspiciously high. There could be a fair amount of good engineers' time in this figure. If there is, could the application work be done economically by others? And if engineering time were freed, could coverage be improved, for example?

13. What do you think is needed to make work measurement more useful?

Base = 302 = 100%

	% of Plants Saying The Need Is . . . great	moderate	little	No answer
Techniques for setting standards more accurately	19%	54%	23%	4%
Faster techniques for measuring work	38%	42%	14%	6%
Simpler techniques for measuring work	41%	36%	16%	7%
Greater interest by management	32%	39%	23%	6%
Better techniques for measuring non-repetitive work such as maintenance and indirect	72%	19%	4%	5%
More personnel in work measurement	22%	42%	28%	8%

A technique to measure non-repetitive work, simply and quickly, is needed.

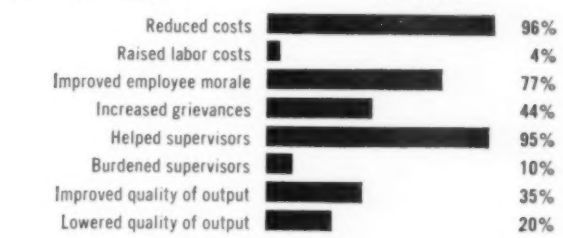
That just about sums up the opinions of plant executives. Nearly three-fourths of them agree that the really great need is a work measurement method that will handle the problems of measuring indirect, maintenance, and job shop production work better than traditional methods.

PTS systems are moving into this area. (For examples, see FACTORY, October 1958 and November 1955.) An earlier question in this survey reveals that PTS systems are in significant use for general work measurement. Perhaps at some other time, another survey will reveal a growing use of PTS systems for measuring the hard-to-measure work. (We have no proprietary interest in any PTS system. We are only reflecting the trends shown in the survey.)

More research in measurement of non-repetitive work is needed. The landslide vote for this need (see chart) verifies it—if there ever was any doubt. All other candidates for the title of greatest need got only secondary mention.

14. In general, what are the results of wage incentives in your plant?

Base = 249 = 100%



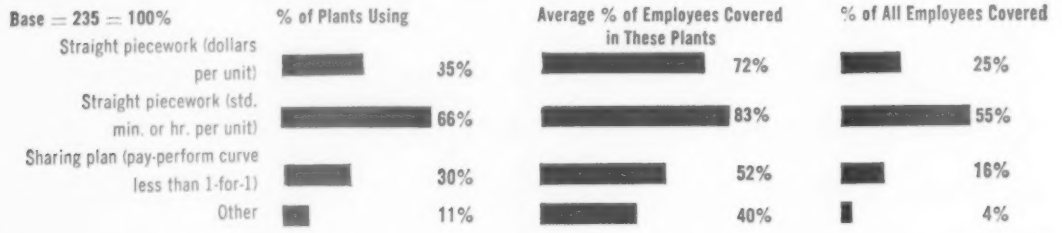
Incentive results—some good, some not.

Overwhelming majority of plants (96%) say incentives have cut costs. But 4%—that's 1 plant in 25—say incentives have raised their labor costs. Perhaps that's an indication of the percentage of plans that have gone sour.

Next largest vote: 95% say incentives have helped

supervisors. Only 10% feel that they have burdened supervisors. We interpret this to mean that the help far outweighs the burdens. Incentives help a supervisor get the work done—divert the pressure for production. But they also add to his managerial duties. He must be able to explain the plan, take some part in developing and applying standards, and handle the grievances that accompany incentives.

15. What types of wage incentive plans are used in the plants surveyed?



They're standard hour plans—two to one.

Straight piecework has come back. But this time it expresses standard in time per unit, or standard hours or minutes. Sharing plans do not now account for as much coverage as before World War II. The relatively high use of monetary straight piecework plans is surprising after all the argument for changing to time per unit. The "other" plans are generally variations of the three basic types that are shown above, left.

16. In general, do you feel incentives for indirect labor have been worthwhile?

Base = 120 = 100%

YES 86%

Indirect incentives are good, but better if measured with direct standards.

Many of both "yes" and "no" opinions were emphasized with comments. For example:

"Could not remain competitive without them."

"Have reduced our indirect head count 40% or more with incentives."

"We believe cost to develop and apply indirect incentives is more than they're worth."

"Can't measure the work so we don't use."

Of the respondent plants that have indirect incentives, 57% use direct measurement, 49% relate indirect pay to direct workers' performance, and 6% do both. Both ways of measuring are represented in the big "yes" vote. But the "yeas" are more prevalent among those that apply standards to the actual work done by indirect workers. Here's the breakdown:

Direct measurement: 90% of users say they like their indirect incentives.

Ratio measurement: 75% of users vote "yes."

The relatively small difference (15 percentage points) is made more significant by voluntary comments of respondents. They added various remarks such as these:

"Yes—where direct measurement is feasible."

"No—Our indirect incentives are related to direct production, not to indirect output. They're just means of increasing pay of indirect workers."

New techniques will boost the trend to direct measurement (Question 13). Many plants use work sampling on indirect work. One uses an "honor system" to assist direct measurement (See FACTORY, January 1959 issue, page 192).

17. What are your guaranteed minimum wage rates to workers while on incentive?

Base = 243 = 100%

	% of Plants
Individual rate	37%
Position rate	35%
Task rate	24%
Minimum legal rate	7%
More than one	3%

Going rates form the floor.

Position and personal rates are guaranteed in 72% of the plants. The once-popular combination of low guarantee and high incentive pay is dying out.

The 7% of plants that guarantee only minimum labor rate are almost all in the apparel industry. Only 3% have not standardized on one type of guarantee. They use two or more types as minimum hourly earnings.

18. How are minimum rates guaranteed?

Base = 249 = 100%

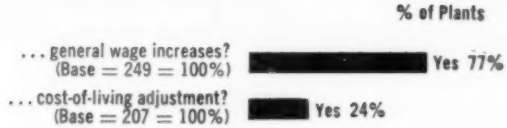
	% of Plants
Daily	32%
Weekly	24%
For each job	22%
Hourly	27%

Daily performance guarantee is the rule, but there are many exceptions.

Practicality of measuring performance within reasonable accuracy generally dictates the guarantee period. Job guarantees are usual for big machine-tool work, sometimes used in maintenance. Indirect work is generally best measured on a weekly basis.

Discount the high percentage of "hourly guarantee." The question may have been misinterpreted.

19. Does the rate used for calculating incentive earnings include . . .



The way you handle the rate affects the "pull" of the incentive.

There are two surprises in the data:

1. Almost one plant in four withholds general wage increases from the incentive calculation rate.

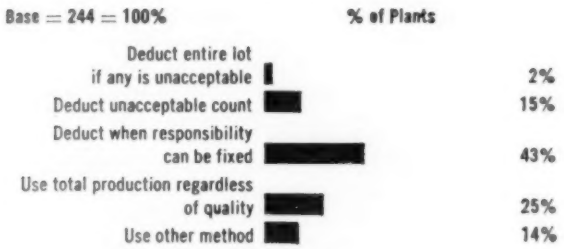
2. The same proportion (but not the same plants) adds cost-of-living pay adjustments to the rate on which incentive bonus is figured.

The significance of these adjustments is easiest to explain by example. Take the case of an employee averaging 25% incentive bonus on an hourly rate of $2. His bonus averages 50¢ per hour. Along comes a general wage increase of 20¢ per hour. If you add this raise to his incentive calculation rate (making it $2.20), his 25% average incentive bonus becomes 55¢ per hour. His gross pay increases from $2.50 to $2.75 per hour. But if you pay the general wage increase as a straight addition to this employee's gross pay, the total average is $2 (old base) + 50¢ (incentive bonus) + 20¢ (general increase) or $2.70. The true percentage of incentive pay then drops to 50¢/$2.20, or 22.7%.

Withholding one general wage increase doesn't affect incentive pay very much. But continued withholding pulls down the percentage of real extra pay—cuts the "pull" of the incentive.

Where incentives are out of hand (loose standards, excessive earnings) they can be brought back to some extent by keeping wage rises out of incentive rates.

20. How do you handle unacceptable output of an incentive-covered operation?



The principle of "no-good product, no incentive pay" is fast vanishing.

Many plants (68%) say it isn't always practical to relate sub-standard product to incentive performance. And 25% of the plants don't even try, but pay incentive on total production.

This doesn't mean quality is overlooked under incentives. It does indicate a separation of quality control practices from incentive procedures. About half the 14% "other answers" say they substitute other disciplinary measures for non-payment of incentive pay on bad product. The other half—most of them in the apparel industry—make workers redo unacceptable product without compensating time.

Note, too, that 3% are very tough. They deduct the entire lot when bad product is found in it.

21. How do you pay employees normally on incentive for non-incentive work?

Base = 245 = 100%

	% of Plants		
	Day Rate	Other	Average Earnings
Jobs for which standards are inadequate because conditions vary from standard	48%	29%	23%
Trial work on new product	47%	19%	34%
Trial work on new equipment	45%	20%	35%
Work that has no standards	66%	18%	16%

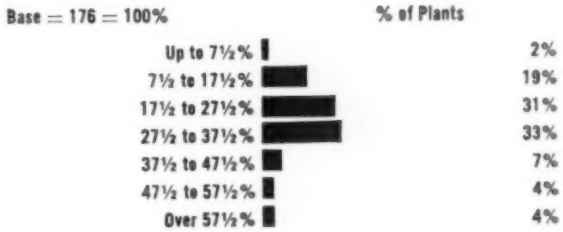
An incentive principle is cracking up.

Most textbooks teach payment of base hourly rate (day rate) for work not specifically covered by incentive time standards. Two-thirds of the plants hold to day rate on work without time standards. That covers the majority of the day-to-day cases. But the plants are more lenient on other unmeasured work.

The "other" answers describe practices that pay somewhere between day rate and average earnings. For example: day rate plus 10¢; 90% of average earnings or day rate, whichever is higher.

Paying average earnings for a little unmeasured work here and there appears harmless—maybe even fair. But the practice brings demands for high earnings floors under new jobs, jobs on new machines, and so on. The problem becomes one of drawing and holding a line where incentive pay is meaningful. The data indicate there's a leak in the dike.

22. What is the average of incentive earnings as per cent of guaranteed hourly rate?



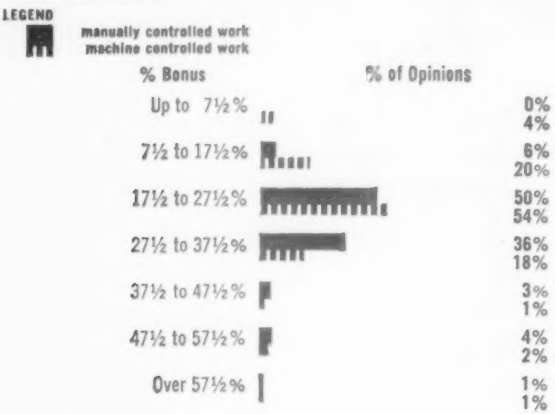
Pretty high, but maybe OK.

Over-all plant average is 28%. Average bonus of production workers is 29%, all others 24%. The extremes are just that—from 5% to over 100%—but 90% of the averages fall between 10% and 50%.

Turn the page

23. What is the best per cent of bonus (as per cent of guaranteed hourly rate) for a plan to pay when workers achieve incentive pace?

Base = 230 = 100%



What people think incentives should pay is little less than they do pay.

The total averages are: manually controlled work, 28%; machine-controlled work, 23%. In the chart above, note that 86% of the respondents think manually controlled work should pay between 17½% and 37½%. But 74% believe machine-controlled work should fall between 7½% and 27½% bonus. This shift explains why the over-all averages are 5% apart. Some went so far as to comment that machine-paced work shouldn't be on incentive, doesn't need incentives.

The 28% average for manually controlled work happens to be the same as the current actual plant average bonus. Evidently, the consensus feels it's about right—for manual work, at least. Used to be that 20% or 25% was generally accepted as high enough for a performance payment plan to work as an incentive. Now it seems to take a little more.

24. Are your employees unionized? If they are, please give further details.

Base = 250 = 100%

YES 82%

If unionized	% of Plants
One union	84%
More than one	16%
Employees represented by:	
Local independent union	8%
Local of international or national union	92%

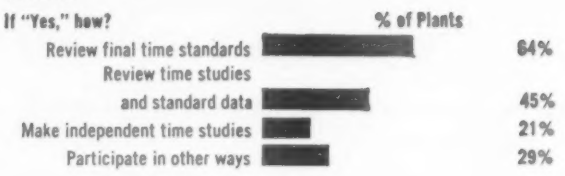
In general we're talking about incentives in plants that are unionized.

Five out of six plants in the survey have one or more unions. More than nine in ten unionized plants deal with a local of a large or international union. From this standpoint the data are representative of the manufacturing industries.

25. Do union representatives take part in incentive administration?

Base = 204 = 100%

YES 38%



Generally speaking, unions do not play a role in the administration of wage incentive plans —at least not officially.

For the most part, union participation in incentive plans is limited to review of standards and, to a lesser extent, the calculations behind the standards. The 29% "other ways" are largely plants in which union representatives come in officially only when there's a formal grievance. In only 21% of the 38% that answered "yes"—that's only 8% of all unionized plants—do union representatives make their own time studies to check on standards set up by management.

One plant reports a curious set-up. Two regular, full-time employees of its work measurement group become union time-study representatives if there's a dispute over a standard.

26. Of the total grievances you had in your plant last year, what percentage was related to wage incentives?

Average percentage reported: 21%

Twenty-one per cent is the over-all average—one out of every five.

Offhand, this percentage may look bad. Without a system of wage incentives a plant might have 21% fewer grievances to handle. On the other hand, as one survey respondent suggested, if the plant had no incentive plan these grievances might be replaced with an equal number dealing with other types of pay problems—or even other gripes.

Another respondent writes that he feels a very low percentage of incentive grievances can be just as bad an omen as a percentage that's too high. If there are no grievances—or very few of them—he says, you may be giving away the plant (without realizing it) in incentive pay for your employees.

These arguments make sense. If you go along with them, the question is: What's par?

The percentage is useful for comparison. But we suggest you go a step beyond what we could do in this survey. Look at the kind of incentive grievances you're getting. Standards too tight? Unfair division of incentive work? Job conditions frequently non-standard? These might give you real clues to your basic incentive problems.

27. How many work stoppages related to wage incentives did you have last year?

Base = 240 = 100%

	% of Plants
None	92%
1	5%
2	3%
4	0.5%–
20	0.5%–

Disputes seldom boil up into stoppages.

Despite the significant percentage of grievances based on incentives (preceding question), only 8% of the plants reported work stoppages (not necessarily "strikes"). Only two plants (less than 0.5%) reported more than two stoppages. One of the two reported 20.

28. Have you ever canceled a wage incentive plan covering a group of employees?

Base = 247 = 100%

YES 31%

You don't have to keep a bad plan.

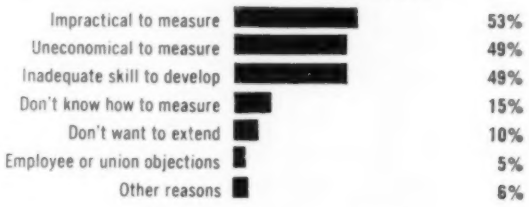
Nearly all the 31% who answered "yes" were counting cancellation for individual groups of employees. The reasons cited in most cases amount to this: For one cause or another the plans weren't working out right.

Two plants reported cancellation of all incentives at one fell swoop. One plan was a "war baby"—a plant-wide bonus scheme. In the other, inequities had accumulated for years. Both plants started from scratch again with new applications and reported data related to their new experience.

Several plants report they do not have incentives now—that they have canceled them all and don't intend to replace them. (An article on this subject will be published exclusively in FACTORY later this year.) These plants are not among the 31% because they do not have incentives now.

29. Why not extend your incentive plan to non-covered work?

Base = 247 = 100%



Total coverage waits for new ideas.

An earlier question pointed up the need for better techniques to measure non-repetitive work. The same problem is holding up extension of incentives. Two other reasons with about the same number of votes are closely related.

Actually there are two distinct problems in the main. The first, already discussed, is one of technique in work measurement.

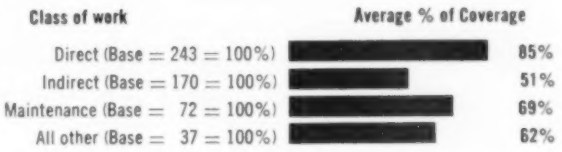
The second is tougher, probably because it involves human relations. It's the problem of providing an incentive plan, based on work measurement, for individuals or groups who do not have, on the average, an opportunity to work at an incentive pace. Basically the problem is one of realigning work assignments. But it can get so complicated that any solution at present is completely out of sight.

Unless the future brings a radically new concept for the solution of these problems, complete coverage with incentives based on work measurement of individuals is an idle dream.

A different approach to these problems does exist. One respondent sent a description of his plant's "Scanlon Plan." (But he didn't complete the questionnaire because the questions don't fit very well.) Briefly, the Scanlon Plan is based on a ratio of total payroll dollars to the sales value of all work produced in the plant. Monthly payroll is compared with the standard. If the actual is less, three-fourths of the difference is credited to employees. Seventy-five per cent of the credit is paid the month after it's earned. The rest is put in reserve to cover deficit months, and what's left of it is paid out at the end of the year.

The Rucker Share-of-Production Plan is similar in principle (FACTORY, January 1955, page 114).

30. In your company what is the maximum percentage of employees who might be covered by wage incentives in the future?



The prospects are discouraging.

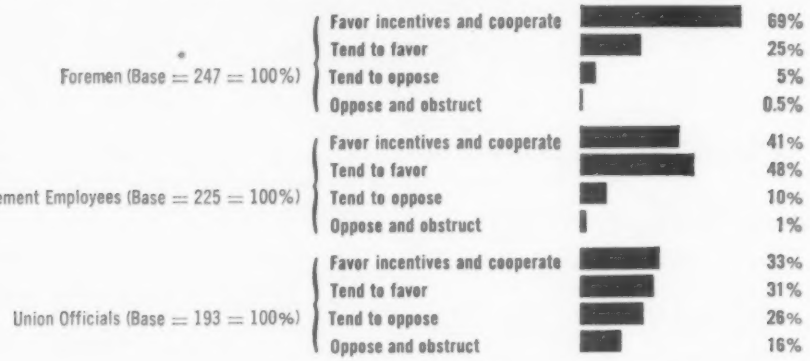
Incentive plans are less troublesome when coverage is high, all other things being equal. The data promise no bed of roses. Among respondents, the consensus on prospective coverage for production work isn't bad. But 15% unmeasured work is equal to almost one day of a normal 5-day work week.

Predictions for other types of work are gloomy. Take the plants that estimated more than zero: The averages leave many workers (or work-hours) without incentive. And the percentages of plants that think they can get some coverage drops sharply for non-production work. Of the plants that wrote something for production, 70% think they can cover some indirect; 30%, maintenance; 15%, other work, too.

There isn't space here to discuss the economic and employee-relations aspects of partial coverage. But they're well known. They balance out to a serious problem in making incentives effective. Seems management has some rough days ahead with incentives—on this score alone.

Turn the page

31. What are the attitudes toward incentives in your plant?


Foremen (Base = 247 = 100%)
Favor incentives and cooperate 69%
Tend to favor 25%
Tend to oppose 5%
Oppose and obstruct 0.5%
Non-Management Employees (Base = 225 = 100%)
Favor incentives and cooperate 41%
Tend to favor 48%
Tend to oppose 10%
Oppose and obstruct 1%
Union Officials (Base = 193 = 100%)
Favor incentives and cooperate 33%
Tend to favor 31%
Tend to oppose 26%
Oppose and obstruct 16%

Everybody likes incentives.

Only a few union officials demur. Nearly two-thirds of them are judged to favor incentives (in the opinion of management men who answered the questionnaire). So despite all the problems and shortcomings associated with incentives, there's general agreement that incentives are good. It's unlikely that there will be pressure from the shop—or in local bargaining—to do away with them as the picture stands now.

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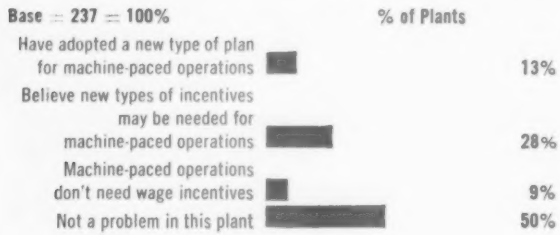
32. How does mechanizing affect incentives?


Base = 237 = 100%
% of Plants
Have adopted a new type of plan for machine-paced operations 13%
Believe new types of incentives may be needed for machine-paced operations 28%
Machine-paced operations don't need wage incentives 9%
Not a problem in this plant 50%

It's changing incentive concepts.

Mechanization shifts control of productive pace from operator to machine. To be sure, we've had incentives on machine-paced operations. But now more automatic machines are coming.

An exceptional process (machine-paced) could have a special type of incentive. But when a plant has several machine-paced operations, what then?

Already 13% of the plants have a new plan for machine-paced operations. Another 29% are thinking about it, see a need for it. That's 42%—nearly half.

A small group (9%) think they've solved it—differently. They say machine-paced operations don't need incentives. Is this right for the 29% who are wondering? If it is, one-third of the plants will tell you to omit incentives when you mechanize.

We think there'll be new types of incentive plans. Two kinds are basic: One stresses meeting machine capacity for output and quality. The other relates incentive pay potential to the work load on operators. But with 29% of the respondent plants thinking about new types of plans, who knows? Maybe other approaches are just around the corner.

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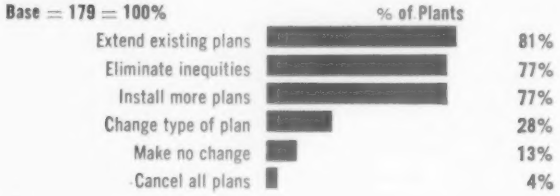
33. What would you do if you had your way?

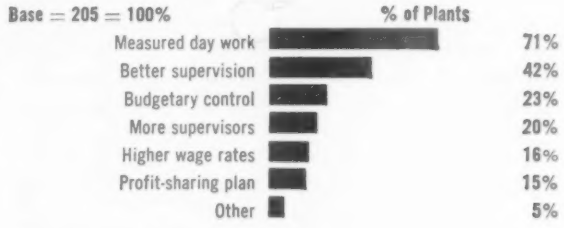

Base = 179 = 100%
% of Plants
Extend existing plans 81%
Eliminate inequities 77%
Install more plans 77%
Change type of plan 28%
Make no change 13%
Cancel all plans 4%

Most people want to keep incentives.

Only 4% of the plants say they'd do away with incentives. The others want to keep them.

But they'd like to make changes. Only 13% would hold the *status quo*. Some 77% want to revise plans to get measurement—and incentive pay—back in line. And 28% would change the type of plan. Then they would put in plans for employees not covered and increase the coverage of existing plans.

34. If you canceled incentives, what would you use instead?



Measured day work is next best.

In light of respondents' answers to the preceding question, the voting on this one is purely academic. In fact, many respondents commented here that they "would not cancel but . . ." Note, too, that "better supervision" —far behind measured day work—received twice as many affirmative checks as "more supervision."

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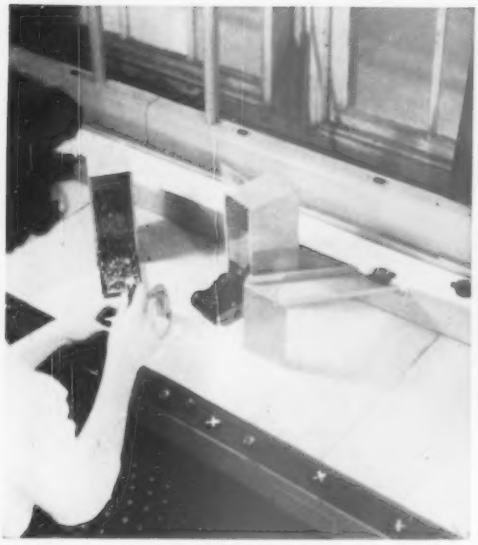
For more about these items, circle numbers on Reader Service Card next to back cover.



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Production-Line Conveyor System

"Building Block" units simplify your assembly of a production-line conveyor geared to suit specific requirements. A system of any desired length can be put together with sections 2½ ft. long which slip into each other easily. An unskilled man can install 100 ft. of conveyor in less than one hour. Disassembling is just as easy if you need to alter the system or store it for use at a later date.

In 2- to 12-in. widths, sections include travel tracks and trolleys for moving chassis, etc.; transport dollies for heavy loads that fit right into assembly line; loads; cleated sections for steep grades; and complete line of feed-on, feed-off devices.

Unit has constant speed or variable speed drives that provide up to 200-fpm. speeds.

Alden Systems Co. (Circle 101).

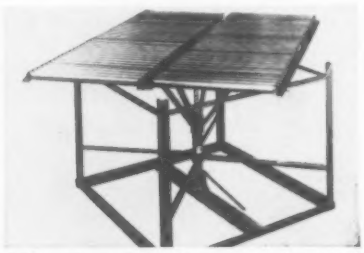
102—Motor Burnout Protector, for single-phase induction motor, safeguards start and main windings both separately and combined. Even protects start winding after main winding fails. Cuts field service failures, repair, replacement costs. *Metals & Controls Corp.*

103—Automatic Palletizer, consisting of motor-driven roller table, elevator and automatic ram, replaces from three to eight men stacking bags over 24-hr. period. Needs no operator. Features automatic magnetic controls or standard relay controls. *Miller Engineering Corp.*

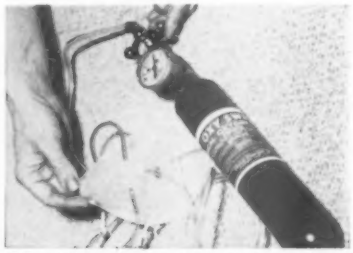
104—Air Hammer, with two different offset flat chisels, a star drill, and a spoon face chisel, comes in kit designed for stripping wire, removing wedges, and other electric motor repair work. Weighs 4 lb., uses 11 cfm. at 90 psi. *Superior Pneumatic & Mfg., Inc.*

105—Fork-Lift Stacker, in 2000-, 4000-, and 6000-lb. capacities, can handle either single- or double-deck block-type pallets or skids. Performs efficiently in narrow aisles. Comes in wide variety of fork lengths, widths, and heights. *Automatic Transportation Co.*

106—Repair Kit uses liquid and paste plastic compounds to permanently mend, patch, and calk metals, wood, cement, ceramics, plastics, and other materials. Eliminates welding, brazing, riveting, or soldering. Cuts labor and repair costs. *Taylor & Art, Inc., Plastics.*

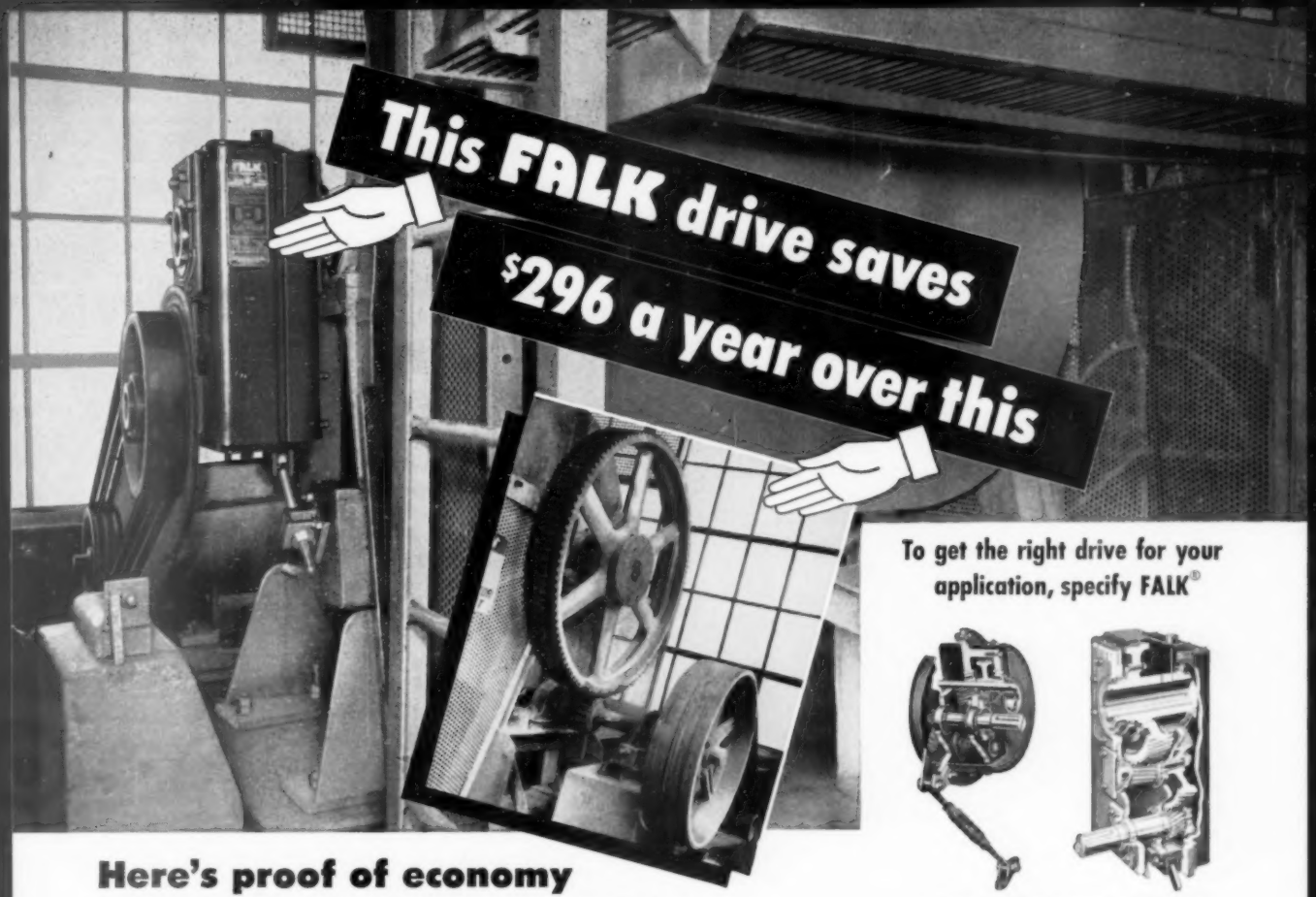


107—Turntable, in various sizes and capacities, comes with single or double row of roller conveyors. Hydraulically operated hand-cylinder or motor-driven pump raises table. Rollers, closely spaced at transfer point, permit easy material flow. *Sage Equipment Co.*



108—Emergency Oxygen Container, weighing less than 3 lb., supplies enough oxygen to last 10 min. It's easily operated, can be used for first aid in cases due to electric shock, and the like. Comes with sanitary plastic face mask. *Astro Engineering Laboratories, Inc.*

Turn the page



Here's proof of economy with FALK Shaft Mounted Drives

PROBLEM—For many years, a prominent Eastern abrasives manufacturer* experienced high maintenance and down-time costs, as well as excessive noise and vibration, in the operation of 19 pebble mills driven by open spur gears. Drive gears and jack shaft pillow blocks required frequent repairs or replacement, and trunnion shafts often failed, due to radial overloading of the bull gear when broken pinion teeth bottomed between gear teeth.

SOLUTION—After numerous unsuccessful approaches to these problems, the solution was found by mounting a Size 315J FALK Shaft Mounted Drive directly on the mill drive trunnion. This eliminated objectionable gear noise and vibration...greatly reduced costly down-time and loss of production...and cut annual maintenance and replacement expenses as indicated by the following figures taken from the customer's records:

Spur Gear-and-Pinion Drive		FALK Shaft Mounted Drive	
Bull Gears	$ 56	VEE Belts	$ 30
Pinions	120	FALK Shaft Mounted Drive (based on 10-year life)	70
Pillow Blocks	90		
VEE Belts	30		
Trunnion (5-year life)	100		
Annual cost	$396	Annual cost	$100
		ANNUAL SAVINGS	$296

IF OBSOLETE DRIVES ARE COSTING YOU MONEY, a change to Falk All-Steel Shaft Mounted Drives can effect important savings in money and production. Used on almost any type of machine, these compact, rugged units are establishing new standards of economy and efficiency in many industries. Specify FALK Drives on your purchased equipment...For full details, **write for Bulletin 7100.**

*Name on request

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in Most Principal Cities

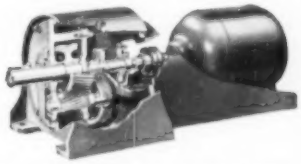
For more facts Circle 492 on Reader Service Card

To get the right drive for your application, specify FALK®

SHAFT MOUNTED DRIVES

Horizontal or vertical units—½ to 50 hp—420 to 5 rpm—single and two double reduction ratios—output torque ratings up to 41,000 lb-in (consult factory for higher torque capacity).

• • •



ALL-MOTOR® MOTOREDUCERS

Sizes up to 75 hp—furnished with or without standard foot-mounted motor—standard output speeds 1.2 to 520 rpm (with 1750 rpm motors)—ratios as high as 54,000:1 in semi-standard designs. Integral units (gearmotor type) also available. Ask for **Bulletin 3100.**

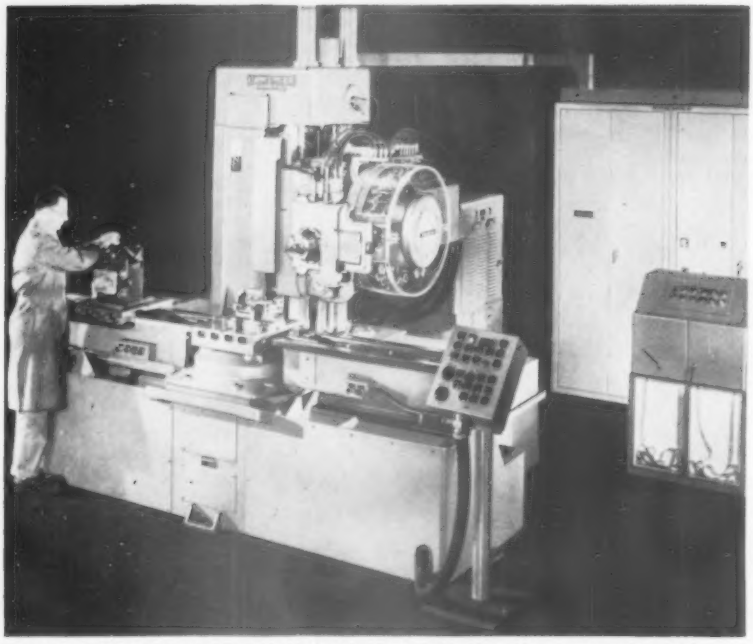
• • •

FALK Drives are available from factory and distributor stocks from coast to coast. Consult your Falk Representative or Distributor.

FALK

...a good name in industry

For more about these items, circle numbers on Reader Service Card next to back cover.



COMPLETED PARTS ARE AUTOMATICALLY PRODUCED WITH THIS . . .

Tape-Controlled Machine Tool

Automation reaches the small-lot manufacturer's production line with a machine that performs milling, drilling, reaming, tapping, boring operations. Tape-controlled, automatic tool-changing Milwaukee-Matic has production capacity equal to that of several conventional units. It bridges gap between job-shop mechanization and automation by reducing set-up time, production time, labor costs, and inventory.

As many as 30 different tools can be loaded at one time into the revolving storage drum, and one in the spindle. Machine can use these 31 tools, in sizes up to 2⅝-in. diameter, in as many as 961 combinations. Numerical tapes control positioning of worktable and three-axis spindle, tool selection and changing, spindle speed, feed rate, etc. Mechanical "fingers" signal drum to continue spinning if improper tool is placed in it. This automatic rejection safeguards machine from accepting wrong tool. *Kearney & Trecker Corp.* (Circle 109).

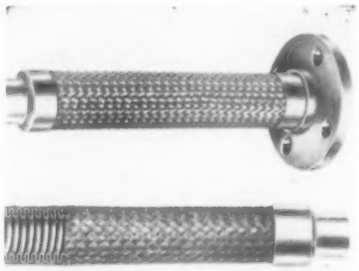
Low-Cost Surface Temperature Meter

Surface temperature can be measured within ±2% full-scale accuracy by this inexpensive meter. Two types: automatically compensated for ambient temperature in ranges 0-300 F., 0-450 F., 0-650 F.; non-compensated for relative temperature in 0-200 C. range only. Tests electronic components that have hard-to-reach surfaces with a 15-deg.-angle side-reading probe. Gives readings in from 3 to 10 sec. *Royco Instruments Inc.* (Circle 110).

111—X-Ray Film Processor delivers finished product in 13 min., an hour faster than most hand-operated methods now used. Unit features self-threading and continuous transport of film up to 17 in. wide. Uses new chemicals to speed processing. *Eastman Kodak Co.*

112—Lift Truck, with 3000-lb. capacity, runs on gasoline or LP fuel, and is powered by 4-cylinder engine delivering 35 brake hp. at 2400 rpm., and 97-ft.-lb. torque at 1400 rpm. Especially suitable for narrow aisle work, with turning radius of 64 in. *Allis-Chalmers Mfg. Co.*

113—Humidity Meter electronically measures relative humidity within ±5%, when probe is as far as 100 ft. away. Portable, lightweight hygrometer uses no tubes, and readings are almost instantaneous. Indicates humidity from 30 to 95% within 32 to 180 F. *Labline, Inc.*



114—Flexible Hose, of stainless steel, reduces pipeline breakage due to excessive vibration. It removes "shakes," dampens noise in many pipeline applications, smooths out pulsations of force pump systems. Rated pressure to 15,000 psi., heat to 1500 F. *Allied Metal Hose Co.*

115—Hand Trucks, in 16 styles and 4 sizes, for medium-duty materials handling, come with 5-in.-diameter rubber casters. Include platform, bin, table, shelf, and box types. Feature smooth interiors for moving delicate materials without damage. *Wilder Mfg. Co.*

Turn the page

LOOK *for improvements in industrial handcleaners*

A NEW WAY to clean working hands

There has never been such a combination of *plus* features to keep workers' hands healthy—and therefore on the job day after day!

It's a brand new scientific formulation — non-depleting Lan-O-Kleen *PLUS*.

It's WEST'S famous Lan-O-Kleen handcleaner . . . *plus* a softer scrubbing action . . . *plus* a gentler sudsing action . . . *plus* a soothing lanolin action!

All of which combine to combat the depletion of natural skin oils while hands are being washed clean.

Highly important is the exclusive process that keeps the rich lanolin content of Lan-O-Kleen *PLUS* "free" to soothe and soften. Lanolin is impregnated into a corn meal base, instead of being "held" in the soap by conventional methods. In this way, it is instantly released for more positive, beneficial action.

Lan-O-Kleen *PLUS* is dispensed from a patented, precision-action unit. A clog-proof measuring valve with a mechanical agitator delivers a thrifty, yet adequate individual portion. More than 435 pairs of hands can be washed with each dispenser filling.

FREE TRIAL OFFER. We'd be glad to send five pounds of Lan-O-Kleen *PLUS* and loan a dispenser for free trial. Or we'll send a smaller sample for evaluation. Just call your local WEST office. Or mail the coupon to our Long Island City Headquarters, Dept. 14.

☐ Supply a dispenser and 5 lbs. of Lan-O-Kleen *PLUS*.
☐ Send a small sample of Lan-O-Kleen *PLUS*.

Name_____

Position_____

PROGRAMS AND SPECIALTIES
FOR PROTECTIVE SANITATION
AND PREVENTIVE MAINTENANCE

WEST CHEMICAL PRODUCTS INC.
42-16 West Street, Long Island City 1, New York
Branches in principal cities
CANADA: 5621-23 Casgrain Avenue, Montreal

WEST DISINFECTING DIVISION

For more facts Circle 493 on Reader Service Card

116—"Pour Easy" Pail Rack balances any size 5-gal. pail, with or without bails. With it you can pour into smaller container without spilling. Eliminates lifting and waste. Will not tip or sway. Made of ⅞-in. 20-gage black enameled steel tubing. *Multi-Meter Corp.*

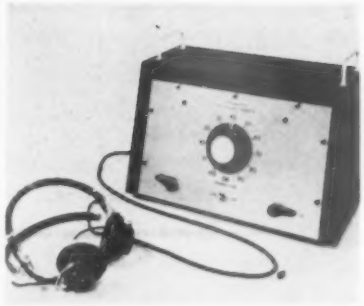
117—Filter Tubes of siliconized glass fabric reduce maintenance costs in filtering high-temperature dust and fumes. Bag-houses using non-glass fabrics can be converted without loss of capacity or efficiency. Eliminates shaking mechanisms. *Coast Mfg. & Supply Co.*

118—Arc Welder, with a-c or a-c/d-c combination, comes in 300 to 650 amp. Optional features, mounted inside welder, include remote control, low-voltage contactor to reduce open-circuit voltage, arc booster. Cooling air flows from top to bottom. *Lincoln Electric Co.*

119—Patch Plate repairs leaking lined tanks in minutes without solvents or cements. Plate is covered with ⅛-in.-thick semi-hard rubber. Then ¼-in. soft rubber gasket is pressure-sealed on tank side. Comes with studs, nuts, back-up plate. *Carl Buck & Associates.*

120—Possons Wrist Bands, made of nylon, for use as pull-back guards on punch presses, toggle presses, etc., provide greater strength than customary leather bands. High-flexibility gives operator more comfort. Cleaned with soap and water, or solvents. *Positive Safety Mfg. Co.*

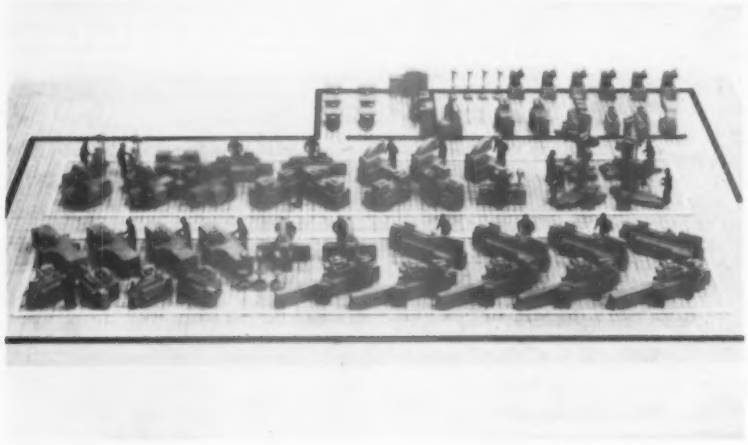
121—Fork-Lift Truck, with pneumatic drive tires and cushion steer tires, is used for both indoor and outdoor jobs. Turning radius of 64 in.; 2000-lb. capacity. Powered by gas engine, coupled with power-shift transmission and torque converter. *Clark Equipment Co.*



122—Audiometer tests hearing loss in speech range and determines its severity within a few seconds. Permits rapid screening of personnel to establish existence and extent of loss. Does not require technician to operate; single dial gives reading. *Tonemaster Mfg. Co.*

123—Btu. Meter continuously records, indicates, and integrates Btu. loss or gain of a flowing liquid. Useful to measure heat transfer in hot-water generators, cooling towers, refrigerating systems, etc. Also charts heat differential and liquid flow rate. *The Hays Corp.*

124—All-Purpose Scaffold, for spot and area maintenance, is ready for use—no erecting, no loose parts. Has bolt-on platform in two sizes with removable guardrails. Four swivel casters permit easy turning in small area. Welded steel construction. *Atlas Industrial Corp.*

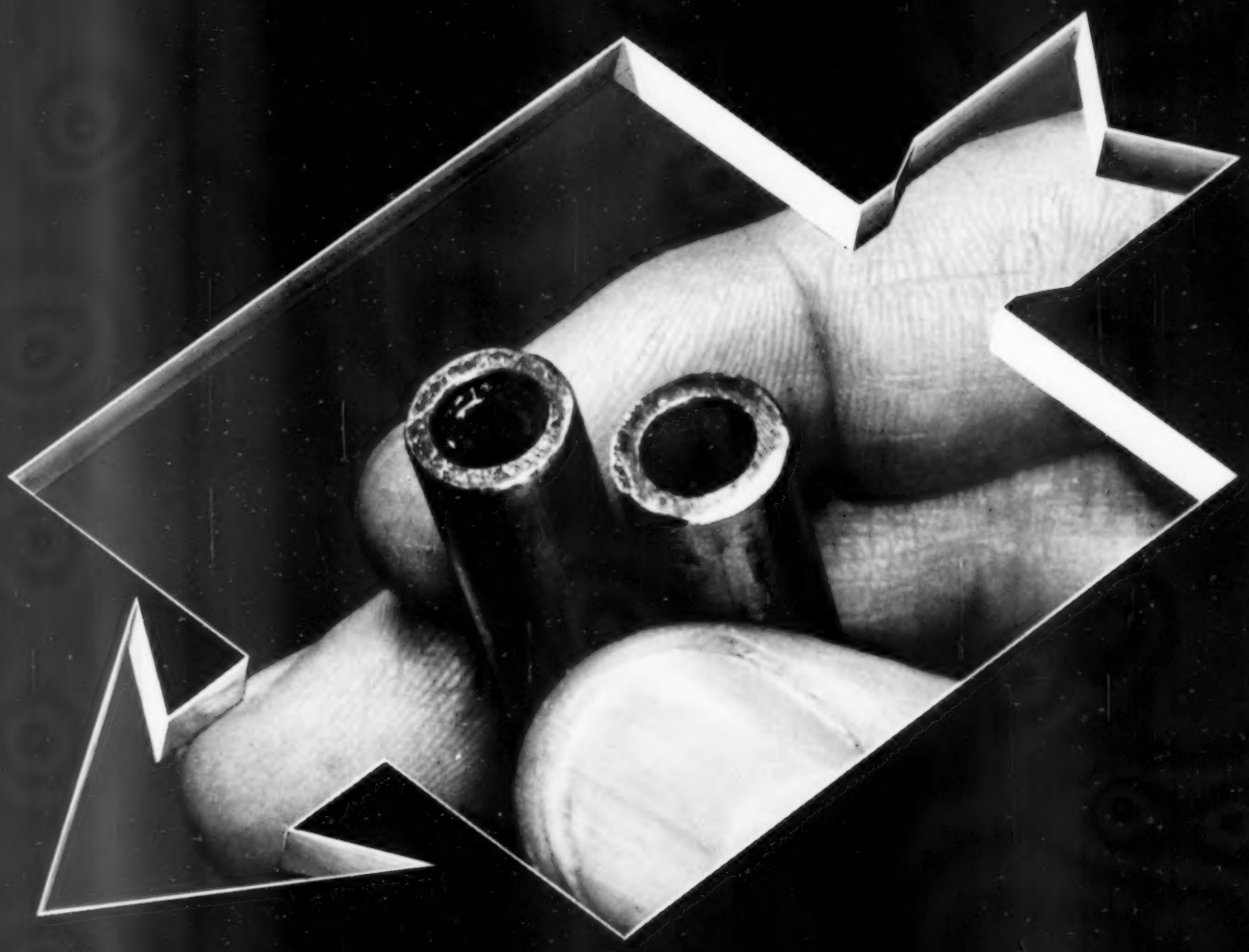


Cutting Layout Costs

These miniatures are not for child's play. They're three-dimensional models of machinery and equipment used to plan rearrangement of existing facilities or lay out a new plant. You can have them custom-built to your equipment specifications or choose from stock items of standard parts in general plant use. Miniatures, built in lead, are exactly reproduced to scale. Planning layouts with these models avoids scale drawing errors that mean costly construction and tearing down. *Comet Metal Products Co.* (Circle 125).

Turn to page 94

Quality–the best economy of all



Two oils...two lines...one clogged...one cleaned

A Sunvis 700 oil and a regular oil were run through two equally clogged hydraulic lines. The regular oil couldn't remove the sludge. The Sunvis 700 oil cleaned its line thoroughly. That's one job it's made for . . . to clean out sludge deposits in hydraulic lines while it transmits power.

With a Sunvis 700 oil—like every Sunoco oil—you enjoy the best economy of all: the economy of quality. A Sunvis 700 oil lasts longer. The machinery it protects lasts longer. It prevents rust . . . ups output by reducing downtime.

FREE Trouble-Shooting Chart will help you spot and cure common hydraulic system troubles. For your copy, write to:

Sun Oil Company, Philadelphia 3, Pa., Department I-12.

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

SUNOCO

New Trend in Steel Buying: Many profit-conscious

"Sweet little money-maker... before we put the wheels on!"

Funny joke! But the boss is not amused.

His company supplies the body of that cart to other manufacturers — successfully, too. Just recently he decided to market a model of his own, complete with wheels. Yes . . . they're selling fast. But the company's losing money on every shipment.

What happened? With late and inadequate cost reports on that wheel assembly, the price was set too low. Weeks passed before the boss found out. And it'll be weeks more before his profits stop taking a licking.

How different with Automatic Keysort punched-card controls! With Keysort's meaningful *on-time* job-cost summaries, management would have known how costs were running at every stage . . . could have acted *fast* to keep them in line. Thus, price could have been set to *cover* cost . . . and the new product marketed with a healthy profit included.

Automatic Keysort is today's only data processing system that provides automatic creation and processing of original records. Speeding vital day-to-day and long-range facts essential to sound management, this unique system employs simplified machines and methods which can relieve your personnel from many routine clerical functions.

With the Automatic Keysort System, manufacturing concerns of every size can now enjoy fast, accurate data processing on either a centralized or decentralized basis. At remarkably low cost . . . without restrictive, complex procedures . . . without specialized personnel.

Call your nearby Royal McBee Data Processing Representative, or write Royal McBee Corporation, Data Processing Division, Port Chester, N. Y. for illustrated brochure F-2.

ROYAL McBEE · *data processing division*

NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

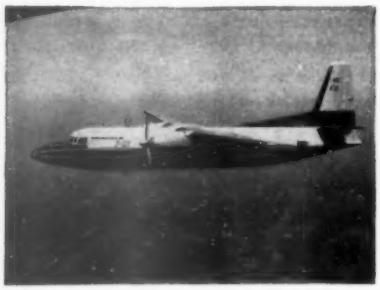
For more facts Circle 495 on Reader Service Card

New Trend in Steel Buying: Many profit-conscious manufacturers taking a long, hard look at steel buying policies; more and more of them cutting costs by purchasing more steel *as it's needed and ready for production* from modern Steel Service Centers.

"Critically needed alloys make 24-hour deliveries a must!"

Prompt deliveries from U. S. Steel Supply help keep this F-27 production line on the move!

The Fairchild F-27, first American-made turbine-powered airliner.



says Mr. V. N. Thacker, Assistant Materials Manager, Fairchild Aircraft & Missiles Division, Fairchild Engine & Airplane Corporation, Hagerstown, Maryland

"We're now producing the first American-made turbine-powered airliner—the Fairchild F-27 Propjet," says Mr. Thacker. "Naturally, during the first months of production with an all-new aircraft modifications are necessary. But despite these changes, which result in last-minute orders, U. S. Steel Supply gives us delivery of the material we need . . . when we need it.

"Here's an example: We ordered 50 feet of 4130 steel, measuring ⅜" x 1", which we needed within 24 hours. Granted, it was a small order, but it was *vital* to the F-27. U. S. Steel Supply delivered it in less than a day, saving many valuable man-hours."

Why not take a close look at *your* steel buying policies—you'll find U. S. Steel Supply's pamphlet entitled "Value Analysis at Work" very helpful. Write to our Chicago Office, or call your nearest U.S. Steel Supply Steel Service Center. You'll find us in the Yellow Pages listed under *Steel*.

USS is a registered trademark

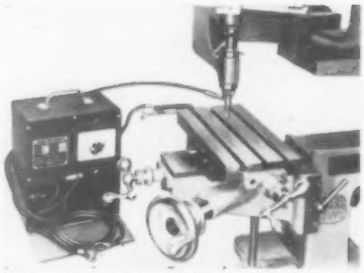
U. S. Steel Supply Division of USS United States Steel

Steel Service Centers and Complete Steel Strapping Service at: Baltimore, Birmingham, Boston, Chicago, Moline, Cleveland, Houston, Dallas, Los Angeles, Milwaukee, Newark, Southington (Conn.), Philadelphia, Seattle, Portland (Ore.), Pittsburgh, St. Louis St. Paul, San Francisco. • General Offices: 208 South La Salle Street, Chicago 4, Ill.

For more facts Circle 496 on Reader Service Card

For more about these items, circle numbers on Reader Service Card next to back cover.

126—Buffing and Scrubbing Pads for floor cleaning machine work well on both sides. For hard-surfaced or resilient floors. Cut maintenance time. Remove heavy wax build-ups, scuff marks, etc. Come in ¾-in. thickness, 12-in. diameter and upward. *Behr-Manning Co.*



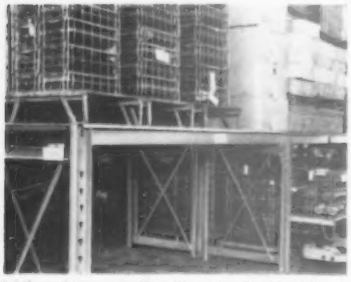
127—Metal Writing Instrument marks electrically any item where engraving, stamping, or etching is impossible or impractical. For marking sizes, part numbers, serial and code numbers, symbols, etc., on hardened tools, gages, machine parts. *H. P. Preis Engraving Machine Co.*

128—Portable Welder, featuring universal semi-automatic wire feeder, is designed for open arc hard-surfacing or submerged arc welding. To operate, connect welding cables and one ground wire from unit to any welding machine. Fits models up to 500 amp. *Hobart Bros. Co.*

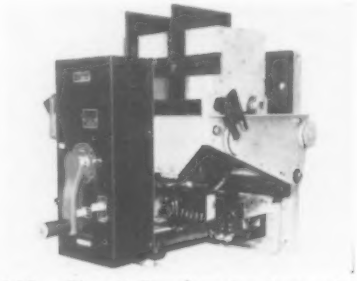
129—Electronic Cafeteria, run by one person, combines automatic door with microwave range to assure hot, freshly cooked food at all times. No pre-heating or waste. Food tray goes into machine when door opens. Prepares sandwich in 7 sec., meal in 50 sec. *Dinnr's Reddy Co.*

130—Lift Truck, with over-all height of 71-in., permits double stacking of freight in truck trailers. Has free lift up to 51 in. Three-battery powered, it has carbon-pile drive control providing stepless acceleration. In 2000- to 4000-lb. capacity. *Clark Equipment Co.*

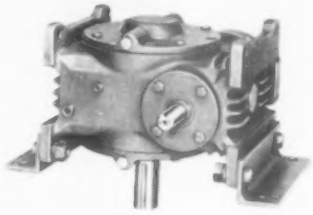
131—Steel Carts, for light- and heavy-duty hauling, move on free-rolling, ball-bearing swivel casters. Light-duty units, in two sizes, have capacity up to 350 lb. Heavy-duty, also in two sizes, have 800-lb. and 1200-lb. capacity. All-welded steel construction. *Lynn Corp.*



132—Storage Rack, single-shelf adjustable, requires no sway bracing front or back regardless of heavy loads stored at any height. Permits front, back access at all times. Easily assembled, cross-bars hook into slots on vertical uprights at desired height. *Palmer-Shile Co.*



133—Circuit Breaker for low voltages is rated at 75,000-amp. interrupting capacity, at 2000- or 3000-amp. current-carrying capacity. Electrically and manually charged stored-energy closing mechanism works even under maximum fault conditions. *Allis-Chalmers Mfg. Co.*



134—Worm Gear Speed Reducer can be mounted in three positions: worm shaft below or above gear, or with output shaft vertical. In 2½- to 4-in. centers, up to 13½-hp. input and 7240-lb.-in. output torque rating. Cast-iron housing with external cooling fins. *Link-Belt Co.*

PRATT, KANSAS: WHERE IT'S 100°-PLUS IN SUMMER

Storm King Aluminum Coating restored these roofs at Pratt Municipal Airport, Kansas. Weatherproof, economical and highly visible, *Storm King* is made by the Warren Refining and Chemical Co., Cleveland 2, Ohio.

Storm King Aluminum Coating solves roof maintenance problem

The City of Pratt posed the problem to Art Waters Roofing Co. Roofs at Pratt Municipal Airport were cracked and dried out, no longer weatherproof or attractive. What new surface would stand up to 100°-plus temperatures in summer, rain and snow in winter?

Art Waters recommended and used Warren's *Storm King* Aluminum Coating, made with ALCOA® Pigments. Today, Pratt Airport buildings are cooler inside, weatherproof outside, appreciably less expensive to maintain. Independent tests have shown that a good aluminum coating will cut maintenance costs more than 30 per cent, reduce wide temperature variations under the roof.

Here's why. Good aluminum coatings such as *Storm King* combine pure ALCOA Aluminum flakes in a tough asphalt-asbestos base. The aluminum "leafs" to form a brilliant, metallic top surface that protects the vital oils from the sun, keeps the coating pliant and waterproof. And reflective aluminum turns back 70 per cent of the sun's heat, reduces inside temperatures as much as 15 degrees.

ALCOA does not make aluminum roof coatings, but we will be happy to refer you to reputable manufacturers who do. Write today for our free booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* Use the coupon.

ALCOA ALUMINUM

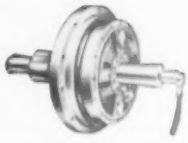
Look for this label . . : it's your guide to the best in aluminum value

For exciting drama watch "Alcoa Theatre," alternate Mondays, NBC-TV, and "Alcoa Presents," every Tuesday, ABC-TV

Aluminum Company of America
1739-D Alcoa Building, Pittsburgh 19, Pa.
Please send your free booklets:
☐ *Aluminum Asphalt Roof Coatings Make Time Stand Still* ☐ *Painting With Aluminum*
Name_____
Company_____
Address_____
City_____ Zone____ State_____

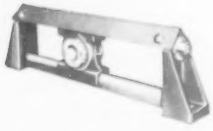
Support your local Clean Up-PAINT UP-Fix Up Campaign

For more Facts Circle 497 on Reader Service Card



AIR-GRIP CLUTCHES
Amazing sensitivity—instant response!

TAPER-LOCK STEEL CONVEYOR PULLEYS
Maximum strength with minimum weight!



DODGE TAKE-UPS
Complete range of stock models, sizes.

•

Write for Bulletins!

- ✓ Air-Grip Clutches—technical data.
- ✓ Conveyor Pulleys—technical data.
- ✓ Take-Ups—Roller, Ball, Babbitted.

DODGE MANUFACTURING CORPORATION
400 Union Street • Mishawaka, Indiana

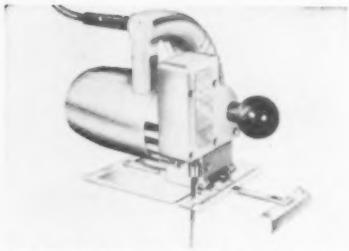
DODGE
of Mishawaka, Ind.

For more about these items, circle numbers on Reader Service Card next to back cover.

135—Emergency Diesel Generator automatically restores full voltage in 1.5 milliseconds if line power fails. For high-speed communications and wherever power loss for few seconds is critical. Resets itself when line power returns. *Consolidated Diesel Electric Corp.*

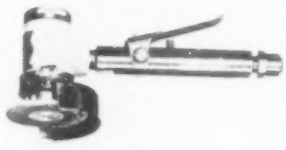
136—Muffler, for intake or exhaust, uses directional vane to channel exhaust air into four silencing chambers, instead of traditional one. Effectively silences steam-and-air-operated devices, pumps, blowers. Muffler is available with exhaust port openings from 3 to 6 in. in size. *Allied Witan Co.*

137—Automatic Air Filter combines high efficiency of electronic precipitator with low maintenance of an automatic renewable media filter. Resistance to air flow is uniform. No water is needed to wash plates so freezing problem is eliminated. *American Filter Co.*



138—Electric Saw, lightweight and portable, can cut a 6-in. board or log as well as patterns. Circle gage permits cutting curves and perfect circles. Air stream clears dust from cut line. It's powered by ½-hp., 110-volt, 6-amp. motor. Price: $45. *Wen Products, Inc.*

139—Portable Belt Conveyor rolls into place and is anchored automatically by a rubber-cushioned stabilizer. For use horizontally, on low or 30-deg. incline. Has removable front-row roller or skate-wheel feeder. In 11- and 13-ft. lengths. *Harry J. Ferguson Co.*



140—Air-Powered Angle Grinder maintains speed of 18,000 rpm. well under load. Operates with minimum of vibration. It is gearless, measures 4½x10 in., weighs less than 4 lb. For use with specially designed depressed-center cutoff wheel, or as sander. *Cleco Air Tools.*

Turn the page

DODGE PILLOW BLOCKS

WITH TIMKEN BEARINGS

America's super-quality line—with a 35 year record of keeping performance *up* and costs *down!* Five types—to fit practically any service condition. All assembled, adjusted, lubricated and *sealed* at the factory for precision performance—long life—dependability.

SPECIAL DUTY TYPE →

- Designed for extreme precision and high load capacities.
- Fully self-aligning.
- Special Duplex Timken Roller Bearing with tapered bore.
- Split tapered sleeve with straight cylindrical bore extends through entire length of housing.
- Easy to mount or demount. Adapter nut (or collar) clamps adapter sleeve to shaft with extreme firmness.
- Automotive type piston ring seals. Bearing is sealed both on and off the shaft.
- Rugged semisteel outer housing.
- Elongated bolt holes provide for lateral adjustment.
- Special dust cap protects lubrication fitting.
- Shaft sizes 1⅞" to 8". Ask your local Dodge Distributor—or write us for Bulletin A670 giving complete technical data on America's most complete line of mounted bearings.

DODGE MANUFACTURING CORPORATION, 400 Union St., Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

DODGE
of Mishawaka, Ind.

"The more you load an Equipto shelf the tighter it grips all by itself!"

EQUIPTO

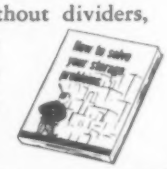
IRON-GRIP

STEEL SHELVING

with the exclusive stud

No nuts, bolts or tools needed when adjusting Equipto Iron-Grip Shelving. Exclusive steel stud permits 60% faster shelf adjustment on 1½" centers. The more you load it, the tighter it grips, yet shelf may be moved easily. You can vary arrangement of drawers, dividers, or shelves to suit changing storage needs. Four uprights per unit allow units to be moved without disturbing adjacent units.

Equipto Iron-Grip Shelving is immediately available from stock in all sizes, either open or closed, with or without dividers, bin fronts, drawers or label holders. Write today for complete reference manual No. 485; also free booklet "HOW TO SOLVE YOUR STORAGE PROBLEMS".

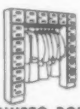


SHELVING

BENCHES

DRAWER UNITS

LOCKERS


EQUIPTO ROBE

STOCK CARTS

EQUIPTO ANGLE

Equipto

812 Prairie Avenue
Aurora, Illinois

FACTORY / EQUIPMENT NEWS

Begins on page 86

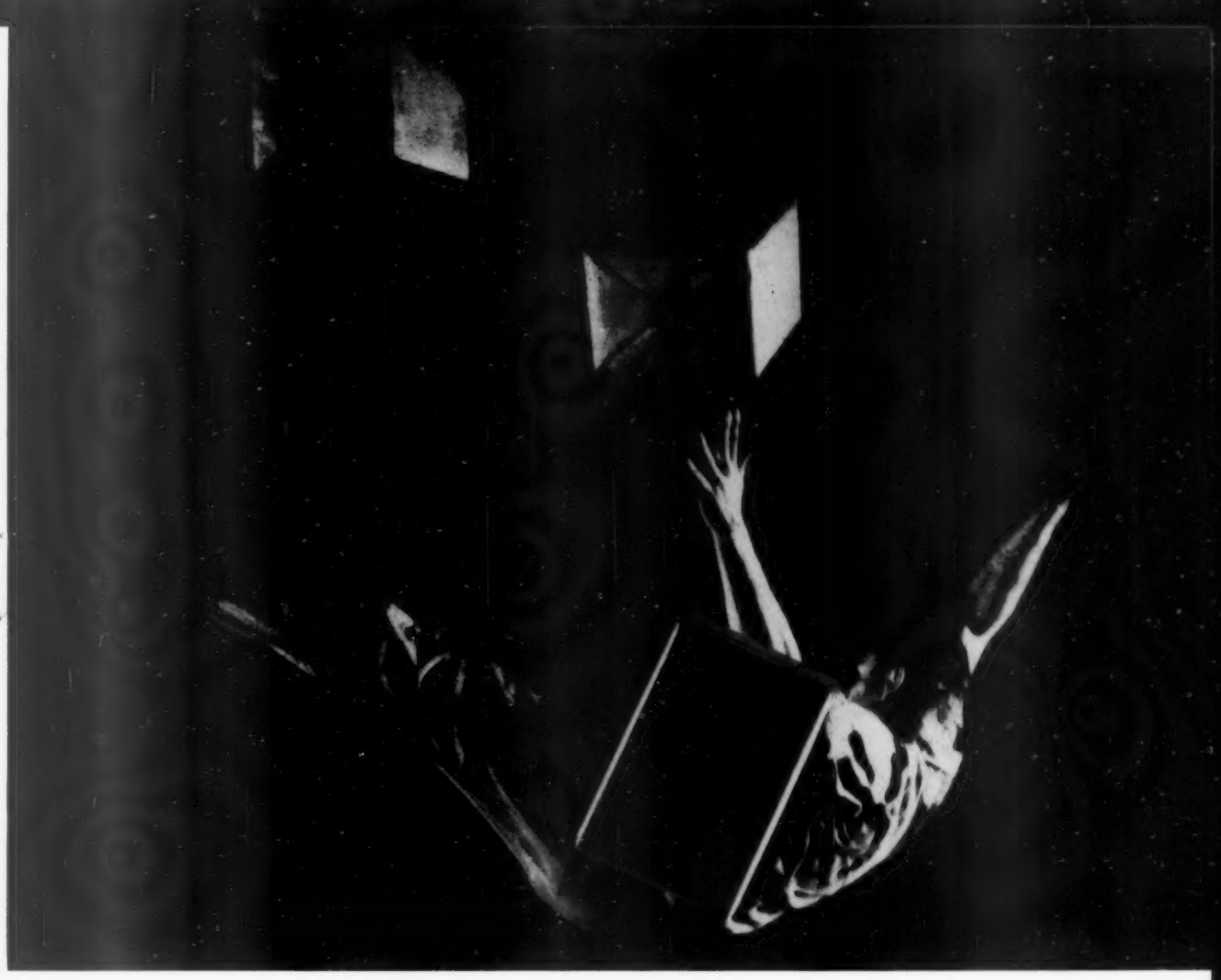
For more about these items, circle item numbers on Reader Service Card next to back cover.

141—Punched-Tape Message Relay receives up to 200 words per minute, converts to tape, then transmits at same or another speed to local or remote receiving stations. For use as business machine-communications linkage, control for automated equipment. *Teletype Corp.*

142—Battery-Powered Caster replaces one or both rigid casters on hand-propelled vehicle. Eliminates "extra man." Works at riding or walking speed up to 10 mph. Handles loads to 1600 lb. For use on stock or hand trucks, hydraulic lifters, etc. *Swartzbaugh Mfg. Co.*

143—Explosion-Proof Thermostat can be installed in walls, exposed to contaminated environments, or immersed in tanks. Adjusts to 32 to 500 F. Withstands −100 F., and, for short periods, up to 100 F. above its set point. Rated at 10 amp., 115-v., or 5 amp., 230-v. *Fenwal Inc.*

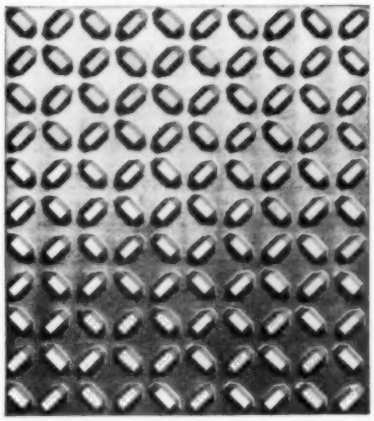
Turn the page



One slip can cost more than USS Multigrip

$100,000 for a single fall? Sounds fantastic, doesn't it? But there are actual cases involving suits for $100,000 or more for single falls. The average cost of injuries from slips and falls is lower than that, of course. In six states, during 1954, the cost per fall averaged close to $900.

You can eliminate many slips and falls by giving your workers a floor studded with cleats—USS Multigrip. This floor plate provides safe traction in any direction. The cleats are flat on top, easy to walk on—and do not catch the shoe.



For machine shops, loading platforms, cat-walks, and other dangerous locations, Multigrip supplies safety plus.

Where floors take a heavy beating from traffic, Multigrip will stand up for years under constant use. Oil and water won't soak in and can be easily removed from the surface with regular cleaning materials. You save money by having a floor that is easy to sweep or flush clean—and there's little or no maintenance.

On your next inspection trip, search out the danger spots—and make them safe with USS Multigrip.

USS is a registered trademark

Sold by leading distributors from coast to coast.

United States Steel Corporation – Pittsburgh
Tennessee Coal & Iron – Fairfield, Alabama
Columbia-Geneva Steel – San Francisco
United States Steel Supply – Steel Service Centers
United States Steel Export Company

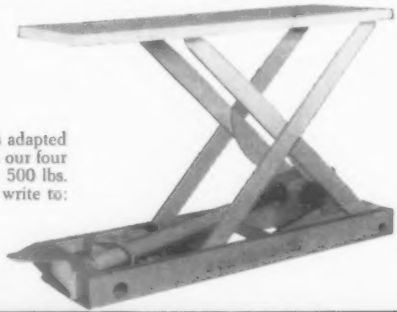
United States Steel

Even a ROCKET ENGINE sometimes needs a lift!

Courtesy of ROCKETDYNE a division of North American Aviation, Inc.

One of the complications of building rocket engines is the necessity of proving them. Rocketdyne transports the thrust chambers for the Atlas intercontinental ballistic missile engine on a transportation dolly to its test site, where they are rolled over a Southworth Lift Table *, which lifts them into relative position. After the thrust chamber unit is elevated and the engine oriented in the test stand, the table is lowered, and the carriage rolled off into the roadway. Seems simple – after the fact!

When your work-positioning problem includes elevating, call in a Southworth engineer. Perhaps a Southworth Lift Table can help there, too.



This is the Southworth L-2 which was adapted for Rocketdyne. For further details on our four Series of Lift Tables, capacities from 500 lbs. to 24,000 lbs.; vertical travel to 64", write to:

*PATENT PENDING

SOUTHWORTH MACHINE CO. since 1890

SOUTHWORTH LIFT TABLES

a division of SOUTHWORTH MACHINE CO., 344 Warren Ave., Portland, Me.

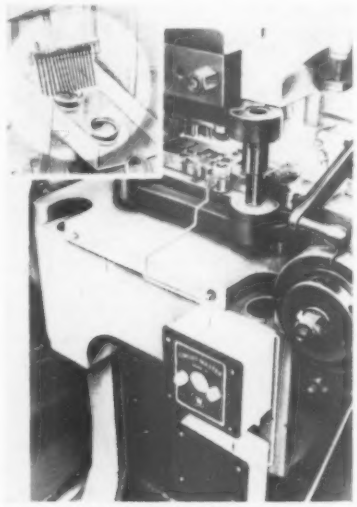
FACTORY / EQUIPMENT NEWS

Begins on page 86

For more about these items, circle item numbers on Reader Service Card next to back cover.

144—Lever-Operated "Tugit" features gearing and load brake instead of usual long ratchet lever and pawl. Permits operating in extremely close quarters with accurate load spotting. Now ¾-, 1½-, and 3-ton sizes supplement 1- and 2- ton. *Manning, Maxwell & Moore, Inc.*

145—Two-Circuit Time Switch turns two lighting circuits on at one time and turns them off independently. Now a stock item, it was formerly available only on special order. In standard model and with standby power unit in case of power failure. *Tork Time Controls, Inc.*



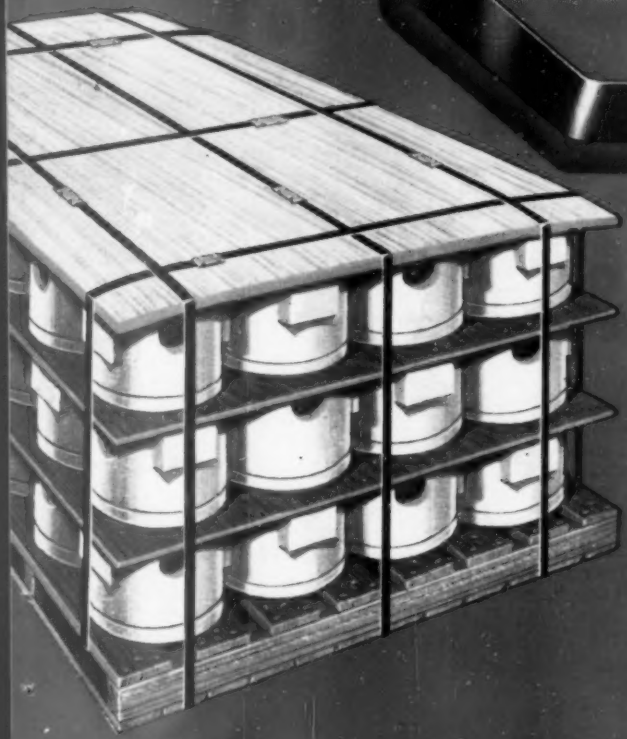
146—Missing Parts Detector automatically disengages clutch of power machine when parts fail to eject. Provides auxiliary protection against misfeed, buckling, overload, end-of-material controls. Spring-wire (inset) spots non-ejections, shuts off power. *Wintriss, Inc.*

Turn the page

For more facts Circle 501 on Reader Service Card

For more facts Circle 502 on Reader Service Card ➤

New Brainard Safe-Ty HiFlex STRAP



New heavy duty strapping– Lighter gauge–Just as strong– More feet per pound– More package conformity

After exhaustive testing in Sharon Steel laboratories, Brainard offers heavy duty strapping customers a new .031 cold-rolled strap to supplement its heavy duty strapping line. We call it "HiFlex"!

HiFlex features superior flexibility for better package conformity . . . gives more feet per pound . . . handles easier . . . faster. Now available along with .035 in ¾" and 1¼" sizes.

This typical advance in heavy-duty strapping is why we continue to say, "Brainard is the strapping industry's most rapidly expanding line."

Brainard representatives are available for consultation. Call or write for a sample —we'll be there!

DIVISION OF SHARON STEEL CORP • WARREN, OHIO

BRAINARD Safe-Ty STRAPPING

In Canada: Brainard Steel, Canadian Division, Toronto, Montreal

MAKERS OF TENSIONAL, HEAVY DUTY STRAPPING, SEALS, ACCESSORIES, TOOLS FOR CARLOADING AND PACKAGING

A-W Hydraulic Crane quickly and easily removes this 6000-lb.-engine and propeller assembly on a Delta Air Lines DC-7.

Versatile Austin-Western Hydraulic Crane speeds aircraft engine changes . . . saves Delta 1000 man-hours yearly

Delta selected the Austin-Western Hydraulic Crane as the outstanding materials handling machine to meet its exacting requirements for maneuverability and load, reach and boom clearance capacities.

Maneuverability important

All-wheel drive and all-wheel steering make the A-W 5-ton crane, with basic 18-ft. telescoping boom, a highly versatile piece of materials handling equipment.

In providing periodic inspection, maintenance and overhaul on its fleet of 73 aircraft, ranging from Super Convairs to DC-6, DC-7 and DC-7B's, Delta changes an average of more than 50 engines each month. It is estimated that use of the A-W crane saves 1000 man-hours annually on engine and propeller changes alone!

To Delta, the biggest single advantage of the A-W crane is its maneuverability around parked aircraft, maintenance stands and equipment. With all-wheel steering, the A-W can make a 90° turn in less radius than its own length. The boom rotates a full 360° for fast front, rear or over-the-side pickup or unloading.

A dependable precision tool

A-W dependability makes work scheduling easier, speeds aircraft back to operational status. Delta has discovered many uses for this all-purpose hydraulic crane in its operations. It is a precision tool that does work faster and easier, with less operator fatigue.

Learn now why men responsible for materials handling everywhere are so enthusiastic about this hardworking new hydraulic crane. See your nearby A-W distributor or write us today for complete information.

Austin Western — 100th YEAR — CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN · LIMA · HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes

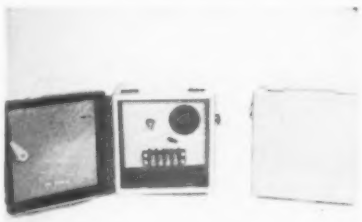
For more facts Circle 503 on Reader Service Card

FACTORY / EQUIPMENT NEWS

Begins on page 86

For more about these items, circle item numbers on Reader Service Card next to back cover.

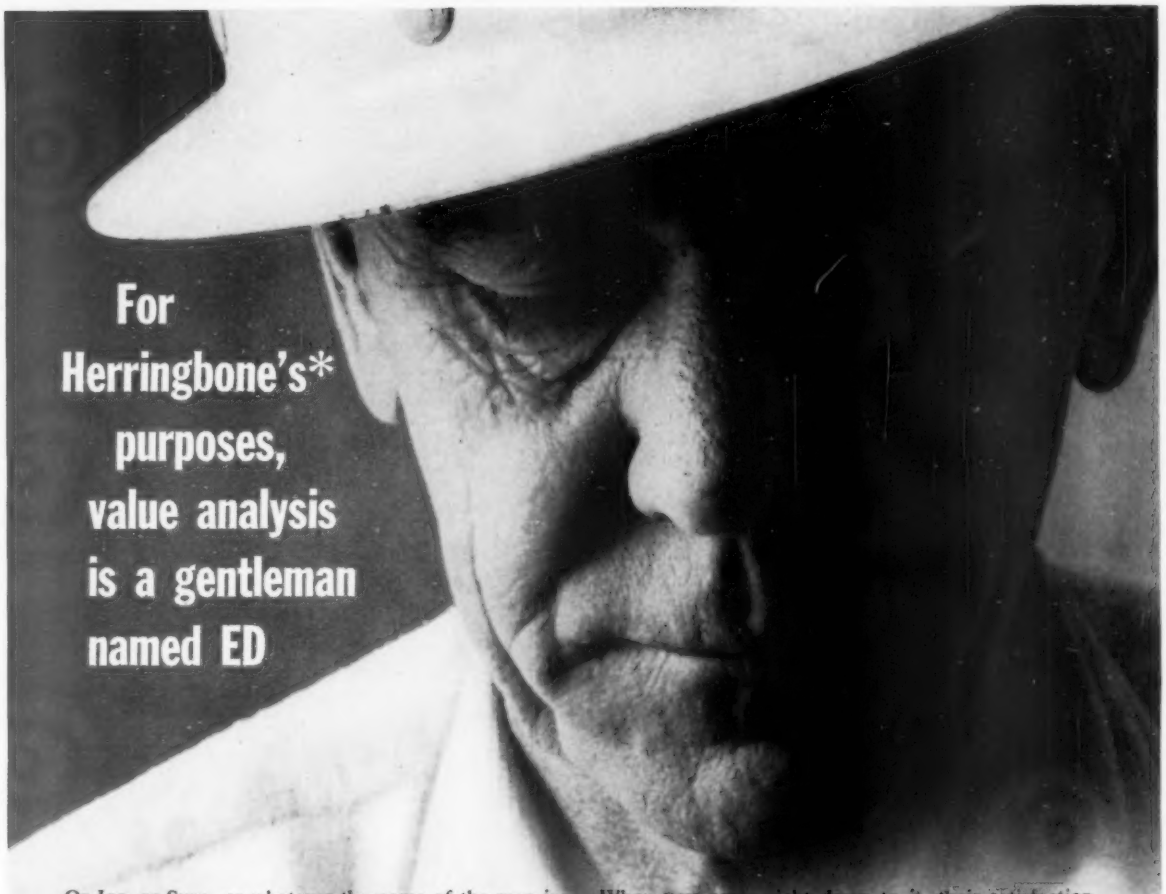
147—Rider Mower, 24-in. size, features front-axle knee-action for rapid, even cutting, no tilting, constant traction on uneven ground, smoother, easier ride. Free-wheeling allows movement when engine is off. Ten forward speeds to 5.84 mph., and reverse. *Devere Co.*



148—Tubeless Photoelectric Unit uses semi-conductor photocells to turn indoor or outdoor lights on or off at pre-set darkness level. Time delay feature prevents actuation by flashing lights. Controls 1800 watts. Operates on 115-v., 60 cycles. *White Engineering Co.*

149—Flame Detector for use with all fuels, including gas-oil combinations and single and multiple burners, features ultra-violet sensitive tube above. Ambient heat rating: 50 to 135 F. Will sight heat to 2200 F., with no ambient light effect. *Minneapolis-Honeywell.*

Turn to page 106



For Herringbone's* purposes, value analysis is a gentleman named ED

Or Joe, or Sven, or whatever the name of the man is in your organization whose opinion on wire rope you most respect. You can take all the value analysis forms ever made and fill them out and get some pretty promising answers. The straightest and clearest answer you'll ever get is from the head gentleman who *works* with the rope; the same man who comes back to you and tells you that the rope he works with *doesn't work*.

We take this stand because the new Roebling Herringbone is championed by men who work with it – the first to feel the impact of a wire rope's success or failure – and the first to tell you about either.

Roebling Herringbone–the two-ropes-in-one rope–is doing things that construction operators find hard to believe–but love to admit. It has prompted a series of some of the nicest testimonials you ever saw.

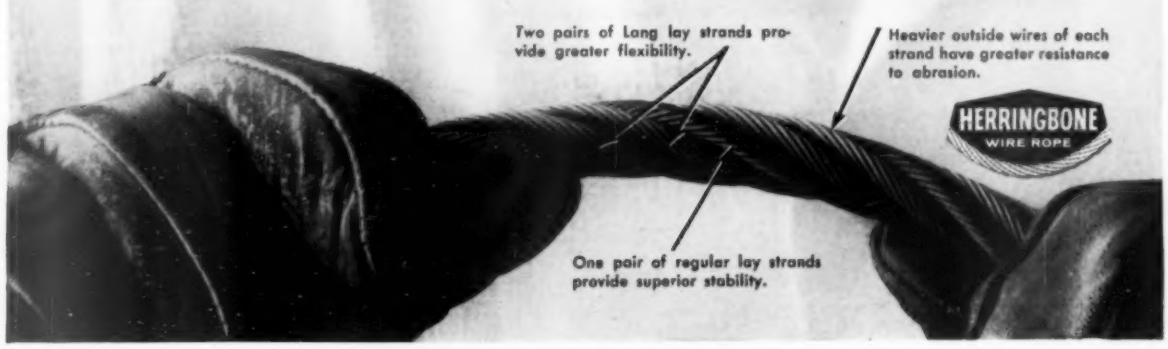
When you come right down to it, their satisfaction is twofold; after all they are working with both a Lang lay and regular lay rope in one. So they are getting the best that both types of rope construction have to give ... and that's plenty.

If you want to write us and get some pure, unadulterated field reactions, opinions from men who count, just drop a line to Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey. With these, we'll take the liberty of sending you the complete information on the rope that makes value analysis a sure thing by the mere specifying... Roebling Herringbone.

*Reg. Appl. For

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation


Two pairs of Lang lay strands provide greater flexibility.
Heavier outside wires of each strand have greater resistance to abrasion.
HERRINGBONE
WIRE ROPE
One pair of regular lay strands provide superior stability.

Discover the difference in Sylvania . . .

Sylvania light bulbs for the home are made by the company that pioneered many firsts in lighting.

Sylvania Silver White Mercury Lamps give you 16% more light than other types.

From the most famous name in shaving—

"To keep America looking sharp— we shave our factory costs with Sylvania fluorescent lighting"

John X. Healey, Jr.
Vice President, Manufacturing
The Gillette Safety Razor Co.

Gillette's Number One position in the shaving field is based on the quality of its products. An important means of maintaining that quality is fluorescent factory lighting by Sylvania—the leader in lighting.

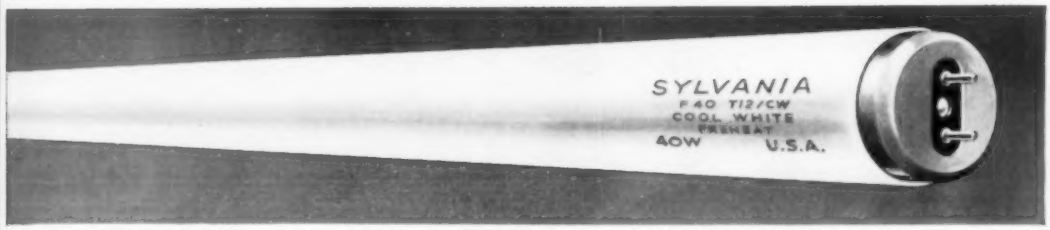
Today, Sylvania fluorescents have the highest light output ever achieved by any conventional fluorescent lamps—an extraordinary new development from the Sylvania Laboratories. They produce far more light from the same wattage . . . they burn brighter throughout useful lamp life . . . they offer more light at lower cost than all other brands. Consistently ahead in fluorescent lamp improvements, Sylvania has grown at a rate far greater than that of the entire lighting industry.

You'll discover the same kind of superiority in Sylvania mercury lamps for streets, highways, airports and in Sylvania incandescent light bulbs for home and industry.

To learn how Sylvania gives you more light at lower cost, write for your copy of free booklet, "How to make lighting a better tool for profits."

SYLVANIA LIGHTING PRODUCTS
a Division of Sylvania Electric Products Inc.
Dept. 9L-3104, 60 Boston Street, Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
P. O. Box 1190, Station "O," Montreal 9

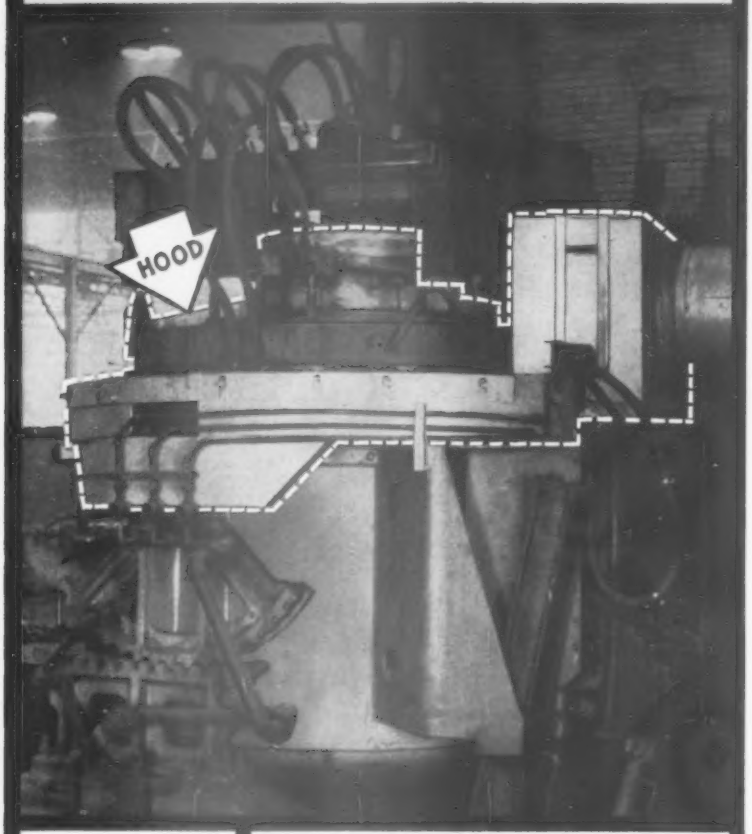
SYLVANIA... fastest growing name in sight



Sylvania Fluorescent lamps maintain more than 7% greater output throughout useful lamp life.

For more facts Circle 505 on Reader Service Card

CONTROL ELECTRIC FURNACE FUMES



Pangborn offers a new concept in electric furnace exhaust hoods!

After years of development, Pangborn now offers effective control of smoke, fumes and dust from electric melting furnaces with minimum interference to furnace operations and maintenance. The hood design is based on the fundamental dust control principle of confining and capturing fumes and dust immediately adjacent the source. Effective control is secured with substantially reduced exhaust air volumes.

The Pangborn Exhaust Hood reduces the weight carried by the furnace roof; reduces hood areas subject to high temperatures; reduces electrode travel limitations and is applicable to top and side charge furnaces of all types and sizes.

With the exhaust hood connected to an efficient Pangborn Cloth Bag Collector, compliance with the most rigid air pollution control regulations is assured. For information call the Pangborn man in your area or write: PANGBORN CORP., 2100 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn CONTROLS DUST

FACTORY / EQUIPMENT NEWS

Begins on page 86

For more about these items, circle item numbers on Reader Service Card next to back cover.

150—Trash Collector, with 10-pocket carry-all accessory, is a handy maintenance tool. "Caddy" tote holds polishes, cleaners, cloths, brushes, and gallon containers. Dirt sack and carry-all fastens to tubular frame with casters, by hooks and snaps. *Walton-March.*

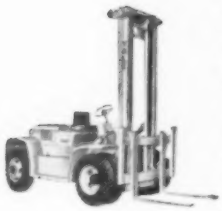
151—O-Ring Seal in this Swagelok fitting can be connected to a female pipe thread and a positive seal secured without use of messy, contaminating sealants. Leakproof seal permits use of fitting for pressure connections, high vacuum applications. *Crawford Fitting Co.*

152—TV Scanner, with wide-angle automatic "panning" range, gives continuous surveillance of an area by single-closed-circuit TV system. Operates in all weather conditions including salt spray, sand, and humidity to 100%. Pinpoint stops possible. *Cohu Electronics, Inc.*

Turn the page

YALE TRUCK OPERATES UNDER ALL CONDITIONS

With speed, safety and stability . . . come rain, shine or rugged terrain!



Bringing loads of 15,000 to 20,000 lbs. over rugged terrain in any weather is part of a day's work for the Yale G-3. Twin cylinder lifting! Low center of gravity! I-beam frame assembly! Extra-rugged overall construction! It all adds up to stability never before attainable in a gas truck of this capacity.

As for speed! The Yale G-3 travels at 20 mph! Lifting speeds up to 60' a minute—extra-fast, controlled lowering, too. Operations are carried out with unusual safety. Operator, seated between widely spaced uprights, has absolutely unhindered forward view. Excellent ground visibility to rear of truck, too.

The Yale G-3 is easily convertible to LP-gas. Available with fluid coupling, standard transmission or Yale's fully automatic Torque Transmission. For further information about this rugged member of Yale's profitable line of industrial lift trucks and hoists, contact your Yale representative. Or write for brochure #5230 to: The Yale & Towne Manufacturing Company, Materials Handling Division, Philadelphia 15, Pennsylvania, Department GT 1-H.

Yale Materials Handling Division, a division of The Yale & Towne Manufacturing Company. **Manufacturing Plants:** Philadelphia, Pa., San Leandro, Calif., Forrest City, Ark. **Products:** Gasoline, Electric, Diesel and LP-Gas Industrial Lift Trucks • Worksavers • Warehousers • Hand Trucks • Industrial Tractor Shovels • Hand, Air and Electric Hoists

when you pack and ship SOFT GOODS

It's quicker to bag soft goods than wrap them. You save on packing and handling costs. Your product is safer, too. More satisfied customers; fewer damage claims.

The towels shown here are hand folded, mechanically compressed and pushed into paper bag by a plunger. Label covers air-escape vent at bottom. It also acts as dustproof seal—assures factory-fresh delivery; locks out dirt during storage.

Today, thousands of different products are shipped in convenient, low-cost paper bags. See how you can save on materials, handling, freight and warehousing. Write for your free copy of Booklet CP-1.

union camp

Commercial Packaging

UNION BAG-CAMP PAPER CORPORATION

233 BROADWAY, NEW YORK 7, N. Y.

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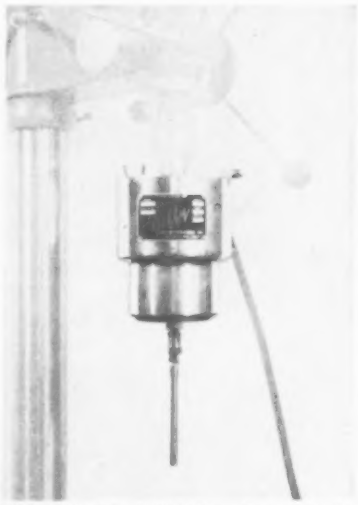


153—Metal Disintegrator works electromagnetically to remove broken taps, drills, reamers, studs, screws. Good for burning shaped holes into hardened metals, cutting keyways, etc. No springs, drive pins, fiber pads, copper coils, solenoids. *Jiffy Disintegrators, Inc.*

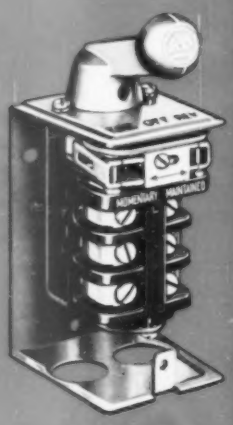
154—Circuit Breakers are non-interchangeable to prevent unqualified person from substituting higher ampere breaker on enclosure that was originally wired for lower. Minimizes electrical hazards. Self-tapping no-return screws hold port channels. *Wadsworth Electric Mfg. Co.*

155—Turntables with capacities to 10,000 lb. and over, are easily installed either above or in floor. Rotate on inner and outer ball bearings for turning heavy loads. Come in checkered or plain table tops, sizes and styles to fit your needs. *Engineering Products Co.*

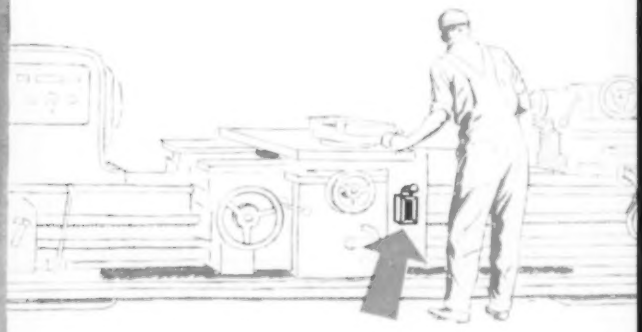
Turn the page

ALLEN-BRADLEY

REVERSING DRUM SWITCHES



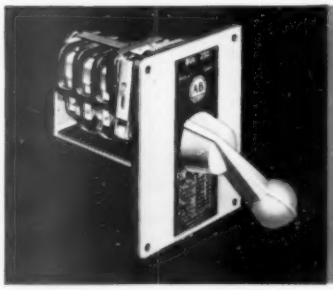
BULLETIN 350
Style A wrap-around cover is removed to show the readily accessible front wiring terminals. Max rating: 2 hp.



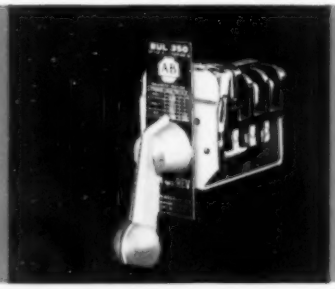
...styled to match the most modern production machines!

Inside and out—this Allen-Bradley drum switch is *all* new. Its trim, modern lines and attractive die-cast aluminum handle will give your production machines "up-to-the-minute" styling.

But there is more than beauty to this new switch. The rugged switch mechanism is a self-contained unit—independent of the enclosure. Misalignment and binding *cannot* occur. The base mounts directly on machine surfaces—without using spacers. And with the wrap-around cover removed, terminal screws are exposed for fast wiring—from the front. Changeover from momentary to maintained contact operation can be made in seconds. Investigate this new "leader" in its field. Send for Publication 6091.



OILTIGHT CAVITY MOUNTING
A-B Style AF reversing switches can be furnished with sealed shaft and rubber-gasketed, oiltight cover for cavity mounting in a machine base.



PANEL MOUNTING
The new Style A switches can be furnished for mounting directly on panels. Nameplate which gives ratings is also included with each switch.

ALLEN-BRADLEY

Quality Motor Control

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

3-59-MR

Reversing Drum Switch for across-the-line starting and reversing a-c and d-c motors. Interlocks available. Bulletin 350. Max ratings: A.C. 20 hp, 220v; 40 hp, 440-550v. D.C. 3 hp, 115-230v.

Speed Regulating Drum Switch for starting and regulating duty of wound-rotor motors. Bulletin 375 non-reversing. Max ratings: 500 hp, 220-440-550 v. Bulletin 385 reversing. Max ratings: 60 hp, 220 v; 75 hp, 440-550 v.

Multi-speed Drum Switch for starting, speed changing, and reversing of multi-speed squirrel cage motors. Bulletin 365. Max ratings: 75 hp, 220 v; 150 hp, 440-550 v.

A-B QUALITY

For years of dependable performance

ALLEN-BRADLEY DRUM SWITCHES

have no equal!

These Allen-Bradley drum switches provide simple and economical control for alternating current motors. Although low in cost, these unusually rugged switches are built under Allen-Bradley standards of *quality* . . . your assurance of reliable, trouble free performance. And this broad line of drum switches offers a variety of mounting types, operating handles, and interlocks to satisfy practically every requirement. Let us send you details on this versatile line of drum switches.

ALLEN-BRADLEY

Quality Motor Control

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

3-59-MR

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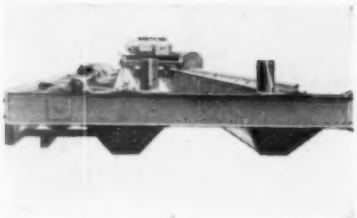


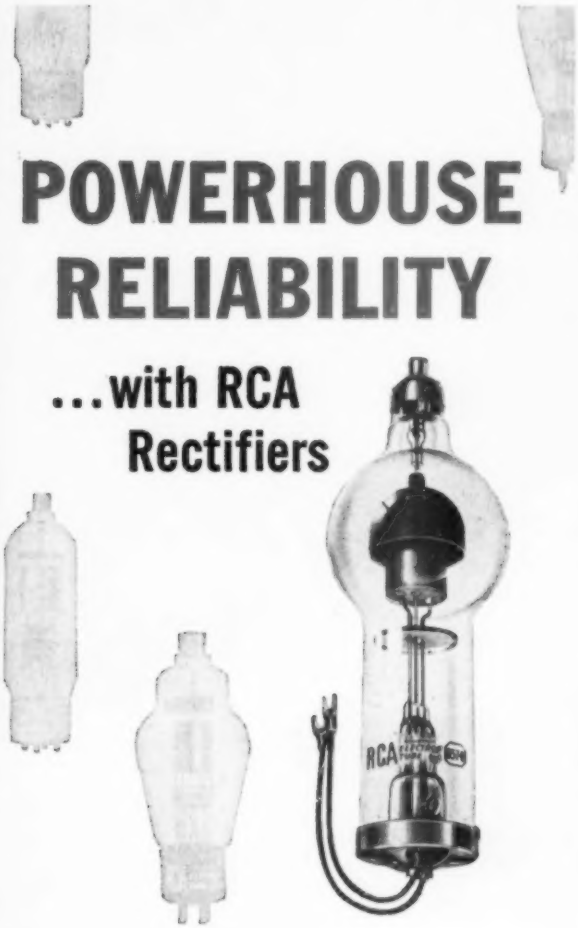
156—Overhead Cranes, with capacities to 20 tons and spans to 60 ft., are low in cost because they use standardized components and interchangeable parts. Features include heavy-duty hoist and steel wheels on bridge and trolley. *Borg-Warner Industrial Cranes.*

157—Two-Passenger Runabout Car gets around your plant fast. Powered by 2-hp., 4-cycle engine with recoil starter, T-Bird operates with one lever—forward for drive, upright for neutral, backward for brakes. Foot accelerator. Price: $198. *Sensation Mower, Inc.*

158—Hydraulic Power Unit, for use as original or replacement equipment, features low gallonage and pressure ratings to 2000 psi. Welded reservoir tank, 5- to 25-gal., has removable cover. For single- or 3-phase operation with ½- to 3-hp. motor. *Essex Conveyors, Inc.*

159—Spray Gun, pressurized by a small, inexpensive compressed air cartridge, uses water or oil-base liquids of normal viscosity to exterminate, deodorize, or disinfect. Delivers either straight stream or mist discharge. Maintains charge when not in use. *Kidde Mfg. Co.*

Turn the page



Proved in hundreds of industrial applications for 'round-the-clock reliability, and lower capital investment per hour of tube operation. Available in a wide choice of standard types and power ratings. At all RCA Industrial Tube Distributors.

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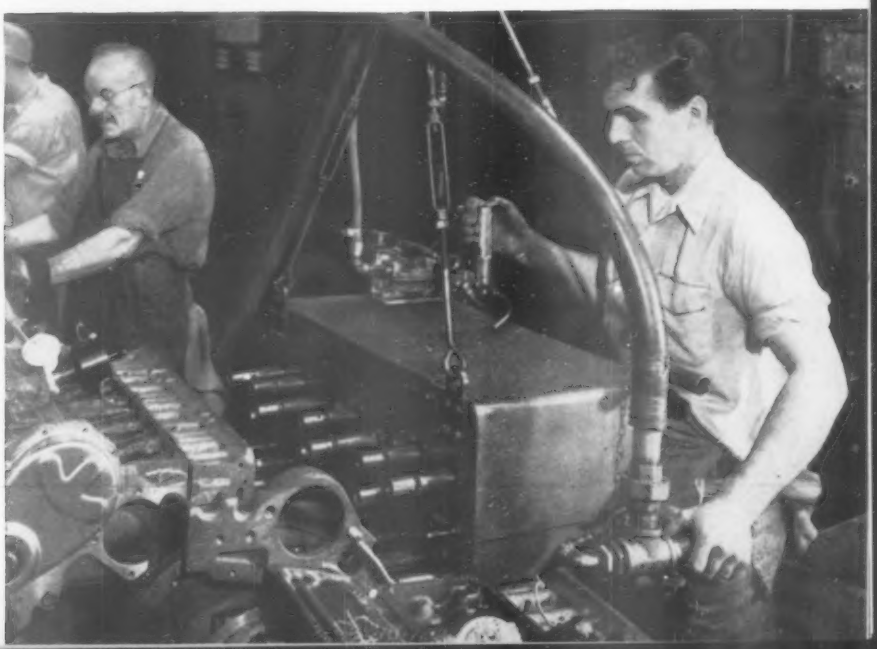
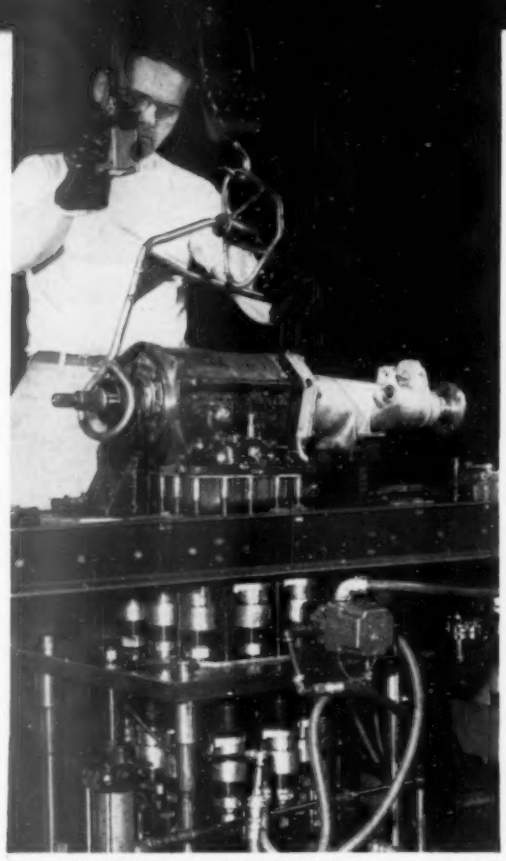
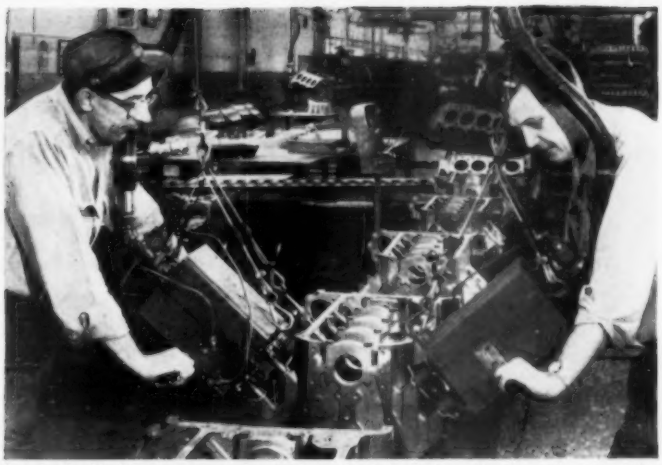
4-spindle Magnamatic Multi-runner.



CP Multi-runner makes installing 18 cylinder head bolts a one-shot operation.



18-spindle Multi-runner drives 5/16" bolts on transmission oil pan assembly.



4-spindle Multi-runners make fast work of installing front motor mounts.

4-spindle Magnamatic Multi-runner sets cap screws on window regulator to uniform tightness, then releases instantly.

PUT "EXTRA QUALITY" INTO YOUR PRODUCT when you use CP MAGNAMATIC Multi-runners

Put CP Magnamatic Multi-runners in the hands of your assembly operators and every fastener—on every unit—will be run to the proper torque. You don't have to do "follow-up" tightening by hand. You can spot check instead of checking every unit. You can hold your quality while you cut your time.

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You can get Magnamatic Multi-runner units in five basic sizes, each adjustable within a wide range, handling torques from ½ to 350 foot pounds.

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For more facts Circle 510 on Reader Service Card

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RIDGID® 300 Power Drive

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This new 300 is clear out of its price class! Its RIDGID-built motor has extra power and extra-long brush life . . . heavy-duty bump-proof switch . . . RIDGID Speed Chuck with guaranteed tight grip, forward, reverse, replaceable jaw inserts and all-metal hand wheel . . . 2 extra-strong tool support bars . . . and a lot of other features that make it far the most for your money. You can't afford to be without it—see and try the new 300 at your Supply House!

No. 1206 Stand for RIDGID 300 *Price $27.00

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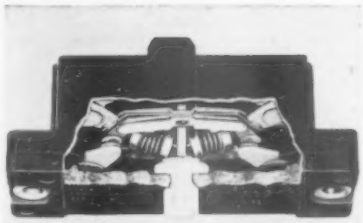
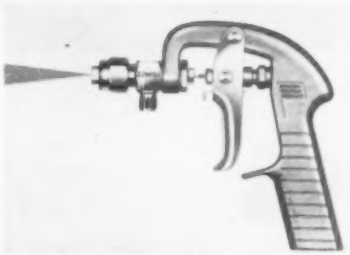
FACTORY / EQUIPMENT NEWS

Begins on page 86

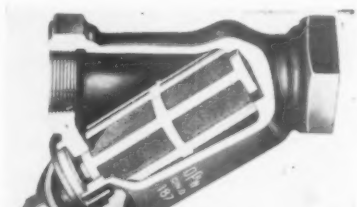
For more about these items, circle item numbers on Reader Service Card next to back cover.



160—Precision Limit Switch, rated at 600 v., has movable contact assembly of two compressed coil springs providing make-and-break action. Springs provide good contact pressure and sufficient wipe to assure good electrical contact on low voltage. *Cutler-Hammer Inc.*



161—Airless Spray Gun, for hydraulic spray coating and painting at pressures to 2000 psi., operates on same principle found in airless paint-spraying systems. Interchangeable orifice tips in wide choice of capacities, spray angles, and materials. *Spraying Systems Co.*



162—Aluminum Strainers, in ¾- to 4-in. screwed ends and 2½- to 4-in. flanged ends, are lightweight, rustproof, corrosion-resistant. Come with woven-mesh brass screens. Stainless steel screens on special order. Operate on 75-psi. pressure, 250 F. heat. *OPW-Jordan.*

FACTORY / EQUIPMENT NEWS

Begins on page 86

For more about these items, circle item numbers on Reader Service Card next to back cover.

163—Sheet Metal Shear quickly and easily attaches to industrial-type ¼-in. drill by removing drill chuck and replacing it with "Docken Shear." Makes curved cuts on sheeting from 16-gage aluminum to 22-gage stainless steel with no material distortion. *C. W. Lind Co.*

164—Lift Truck, with capacities of 36,000- and 40,000-lb. at 36-in. load center, has 6-cyl. engine developing 153 hp. at 2400 rpm. Features include pressure lubrication of rods and bearings, mechanically driven fuel pump, built-in oil filter and cooler. *Hyster Co.*

165—Oscilloscope, for industrial testing, audio development, and general utility applications, comes in kit form. Designed for easy assembly with simplified circuit layout, standard markings, and symbols. Frequencies from 5 cps. to 50 kc. in four overlapping ranges. *Heath Co.*

Turn the page

We're Still Looking for a Pipe Fitter Who Doesn't Prefer RIDGID®

"Of Course I said RIDGID ... It's the only pipe wrench for my money. I've got work to do!"

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The Ridge Tool Company Elyria, Ohio, U.S.A.

THREADED PIPE... *It's Tight... It's Best... Costs Less!*

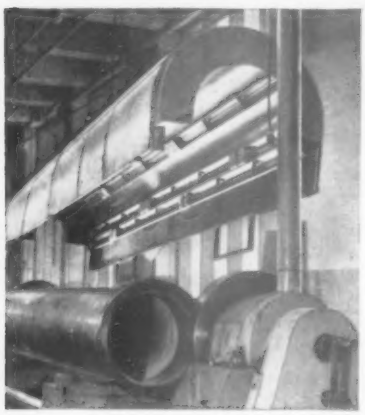
For more facts Circle 512 on Reader Service Card

HOW CHROMALOX ELECTRIC HEAT
helps make it... and make it work

...the U.S. Navy's new Mark 32 fibre-glass torpedo launcher

From its unlikely beginning as a fibre-glass mat . . . to its successful operation in sub-freezing sea spray . . . the Mark 32 torpedo launcher testifies to the versatility and dependability of Chromalox electric heat. Designed and built by Apex Reinforced Plastics, division of White Sewing Machine Corp., this lightweight, corrosion-resistant launcher is now in service on Navy destroyer escorts.

Early in production, a Chromalox-heated hood is used in centrifugal molding of the launcher tubes.



First, a rolled fibre-glass mat is placed inside the mandrel, which is then engaged in spinning motion at 800 rpm. After thermosetting resin has been sprayed into the mandrel, the hood is lowered into position for heat curing. The Chromalox type RAD Far-Infrared Heaters have a total capacity of 36,600 watts, and reach approximately 200°F. in about 45 minutes. The hood remains on a total of about 3½ hours, throughout the spinning operation.

Before final assembly, each tube must have steel "nut bars" and "guide bars" cemented to its interior. (Nut bars connect the three tubes into one assembly; guide bars guide torpedoes into the launcher tube.) After these parts are cemented in place, two Chromalox Tubular Heaters wired in series set the cement.

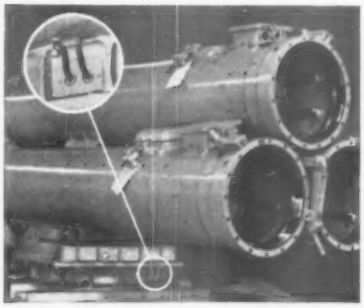
Mounted in a frame which holds them in the center of the tube for its entire length, the 240-volt, 2750-watt heaters are controlled by a Chromalox type AR Thermostat. A small fan attached to the end cap circulates heat within the tube and eliminates condensation.

Next, four plastic quadrants are bolted to the tube interior, forming a liner to accommodate 12¾-inch torpedoes. To each quadrant are affixed two 101-inch Chromalox Flexible Woven Heaters.

After resin has been applied to the two channels in each quadrant, heaters are laid in place as shown below. The leads are then connected

to a power outlet and the heaters set the cement which bonds them in place. In action, these heaters maintain a protective 50°F. minimum temperature for the torpedo.

The closeup below shows two leads of a circular Chromalox Tubular Heater clamped in a groove around the launcher's swivel base. To prevent formation of ice in the joint between fixed and rotating parts of the base, this heater comes on automatically when the temperature drops below 50°F.



Plastic bottles, containing air at 2000 psi, provide pneumatic force to launch the torpedoes. Fabrication of these bottles, by the unique Apex filament winding process, involves still another Chromalox Heat application. After the plastic bottle has been formed around a Cerro-alloy ball mold, the alloy must be melted from the bottle's interior. Four sets of Chromalox Strip Heater Bands and a Chromalox Ring Heater provide booster heat on the steam-heated vat used for this purpose.

Perhaps one of these heaters, or one of the 15,000 other types, sizes and ratings of Chromalox Heaters can answer your need for heat. For personal assistance and specific recommendations, *Call your Chromalox Man for the Answers.* He's listed at the right. 7757

CHROMALOX
Electric Heat
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Philadelphia 2, Pa.

FACTORY / EQUIPMENT NEWS

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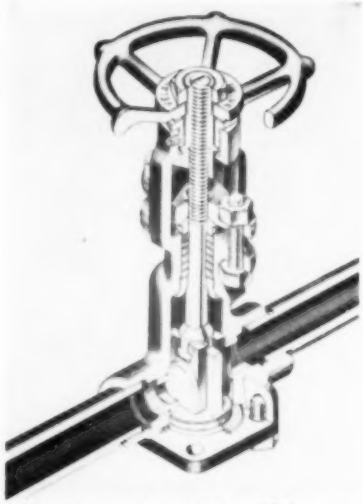
166—Shock Absorbing Hammer, known as "Shure-Drive," minimizes fatigue of hammer-in work. Head is insulated from hammer handle by resilient "shocks" within the head housing. Has two-thirds less rebound than conventional hammers. *Olin Mathieson Chemical Corp.*

167—Bending Machine, for maintenance and limited production work, adds to its line two die attachments: (1) to bend handrail capping into lambs' tongues, volutes, edgebands; (2) to form single-and-double turn scrolls in seconds. Uses no wrenches. *Hossfeld Mfg. Co.*



168—Bonnetless Gate Valve, in sizes to 2 in., eliminates gasket leakage. Permits quick replacement of seats, wedge, and stem without removing valve from line. You can flush, decarbonize valve while in line. Tightness tests possible under pressure. *Velan Valve Corp.*

Turn the page

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GENERAL ELECTRIC

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Eriez, as pioneer and world's largest producer of magnetic equipment for industry, manufactures equipment which utilizes the *best magnetic power source for your specific requirements* – at the most sensible cost to you. We do not make magnetic materials, nor are we obligated to use any special types. For that reason, we make our equipment with a variety of magnetic materials families including Alnico V, Ceramic V, Magnetic Rubber, and others. Each of these materials has certain advantages and disadvantages; we point them out when making recommendations for *your* particular needs. As new materials are thoroughly tested and proved efficient, we incorporate them into our equipment.

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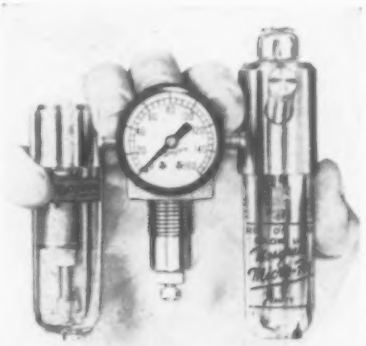
Eriez Mfg. Co., 70-RB Magnet Dr., Erie, Pa.
WRITE FOR BIG COMPREHENSIVE FACT FILE OF MAGNETIC SEPARATION AND VIBRATION EQUIPMENT

ERIEZ

For more about these items, circle item numbers on Reader Service Card next to back cover.

169—Nozzle Applicators spray Thermon heat-conducting cement uniformly, cut labor costs over old hand troweling method. Connect to pneumatic pumping equipment or hand-operated guns. Eliminates air voids; better bonding assures better heat transfer. *Thermon Mfg. Co.*

170—"Packaged Environment" structures can be placed outdoors or indoors. Provide low-cost environmental control for testing, repair, or packaging. Heat held to plus or minus ½ deg. F., humidity within 2% relative. Air contaminents filtered to 0.5 microns. *Moore & Hanks Co.*



171—Lubricating Control Unit, consisting of air filter, pressure regulator, and "Micro-Fog" lubricator, processes compressed air to service air cylinders, chucks, tools, etc. For air flows from 0.05- to 20-cfm. For ⅛- and ¼-in. pipe installations. *C. A. Norgren Co.*

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PERFORM BEST
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PARTICULAR APPLICATION

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permanent non-electric
MAGNETIC PULLEYS

Only Eriez – with its years of know-how based on solving magnetic problems of all types for industry – offers such a wide range of PERMANENT MAGNETIC PULLEYS to meet your specific needs. Remove tramp iron or iron fines efficiently, economically, *automatically!* Size for size, Eriez Pulleys provide two to three times greater magnetic fields than limited radial center air gap units. Magnetic strength unaffected by heat or cold. No "weak spots" . . . magnetic strength extends across entire Pulley face. Standard sizes range from 4" diameter thru 30" diameter and in many belt widths.

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PLANT OPERATING MANAGEMENT

CASE BOOK

WARREN J. KING
Manager, Features and Departments

THIS ENGINEER RUNS A JOB SHOP BORING AND TURNING MILL WITH PUNCHED TAPE . . . PAGE 121

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Oil Under the Parking Lot

Employees will soon be parking their cars on top of a large underground oil tank at the Los Angeles tire plant of United States Rubber Company. Putting the oil tank underground serves a dual purpose. Employees can retain their parking area. And the company can keep a 4-month supply of oil on hand. Before construction of the underground tank, the plant had to depend on daily oil deliveries made to two small tanks next to the power house.

The circular tank has prestressed walls, holds about 1.3-million gallons of fuel oil. It measures 105 feet in diameter and 21 feet high. It has leakproof neoprene rubber seals between the wall sections, between the wall and the base, and under the columns.

Prestressing wire around the external circumference varies from 31 turns per foot at the bottom to only 3 at the top. After the first wrapping, the bottom 5 feet was covered with pneumatic concrete and wrapped a second time.

The 4-in. floor slab rests on a foundation of graded sand. It has a minimum strength of 3000 psi., is graded slightly toward one low sump. Twenty-one reinforced concrete columns, along with the walls, support the roof slab.

The tank needs no heaters. Two submerged, screw-type pumps transfer the oil to small day tanks for immediate use. For added safety, fresh oil enters the tank 3 feet from the bottom to eliminate surface loading. Connections, for use by tankers, are completely protected adjacent to the tank.

These Lights Move on Tracks

Lights can be shifted where they're needed at the three-story purchased-parts center of the new Convair Astronautics plant at San Diego. Mounting the fluorescent lights on

trolley bus duct makes them mobile. And in doing so, lighting costs are cut one-third.

The arrangement provides 30 foot-candle illumination for the storage area. Three equally spaced lights are available in each of the 26 aisles. When more-than-usual lighting is needed in any one section, fixtures can be grouped to provide it. The luminaires reflect nearly all light downward. This is necessary because floors and ceilings are open grillwork.

The Astronautics purchased-parts center is one of the interesting features of this new plant, where Atlas missiles are produced. The three-story structure is located in the highest portion of the plant, has a dismountable steel framework with grillwork for floors and ceilings. Storage shelves serve as walls. If needed in the future, a fourth floor can be added without interfering with overhead crane operations. A reversible conveyor connects all levels with the main floor.

CUSTOM UNITS NEVER HOLD UP PRODUCTION

Here's mass production with a customized twist. Non-standard air conditioners are modified to meet special customer demands at Westinghouse Electric Corporation's Staunton (Va.) plant. But they don't throw production schedules into spasms. Here's how: The plant has a special modification center (photo) where regular units can be altered for out-of-the-ordinary features in supply voltage, controls, fan assemblies, and water and air outlets. Instructions come directly to the center from the engineering department. All modification work is done on a spur conveyor at one side of the regular unit production line.

Makes Waste Heat Work for You

Using waste heat can help you cut fuel costs. And regenerative air preheaters can help you do this anywhere hot gases go to waste. The packaged unit shown above is at the Groton, Conn., plant of Chas. Pfizer & Company. It will operate with a 165,000-lb./hr. boiler, but can handle up to 180,000 lb./hr.

These factory-assembled preheaters (Air Preheater Corporation, New York City) are cousins of the Ljungstrom units used by utilities. Can be designed for boilers ranging from 25,000 to 250,000 pounds of steam per hour.

Tape Control Moves Into the Job Shop

(Cover story)

Magnetic-tape path control is moving outside the aircraft industry. The Gray Tool Company of Houston has just purchased this magnetic tape-controlled vertical boring and turning mill to contour machine valve bodies.

The contour machine has a 5-position right-hand turret head with power indexing and a left-hand swiveling ram-type tail head. Feed and traverse of turret head, ram, and saddle operate by tape or pendant control. And so can turret indexing and table speeds. The left-hand head is not tape-controlled on this unit, but could be. Both the 54-in. machine and its Numeripath control were developed by the Giddings & Lewis Machine Tool Company (Fond du Lac, Wis.).

The flexibility and capability of tape control is right down the line of Gray's production requirements. The new machine substantially reduces set-up time on special oil valves, eliminates difficulties in holding and duplicating tolerances of complicated pieceparts on both short runs and production runs. Even on complex contoured one-of-a-kind pieces, Gray finds that the programing and preparation of tapes is practical. And stored tapes make it easy to duplicate these parts at any future time they're needed.

The Numeripath control includes a director, magnetic tape recorder, and control console equipped for tape playback. The director interpolates programed data from punched paper tape and transmits electrical impulses to the magnetic tape recorder. These permanent tapes then operate the machine.

Stops for the inspection of work or tools can be programed as required. And "playback" stops can also be provided for taking a second cut on a contour whenever greater depth is needed. A simple switch on the control console can place the machine on manual operation at any time during tape operation should production processes require it.

It's an Easy Job to Lift This Floor

Even the big seal of the City of New York lifts out of place, though it's four times the size of other floor plates. The plates provide easy access to cables and other auxiliary services needed to operate the new computer center in New York City's Municipal Building. The only tool needed to remove them is an ordinary hand suction cup.

The floor (Floating Floors Inc., New York) features quick assembly and removal as well as flexibility while in use. It consists of self-aligning aluminum floor plates supported on pedestals with self-locking heads. Pedestals rest freely on subfloor. Floor can take point loads of 1000 pounds or uniform loads of 250 pounds per square foot. A special inlay technique made it possible to reproduce the seal on the surface of the floor.

Saving Power Cuts Costs

Interested in cutting your power bill? Here are ideas to start you thinking along the right track. They come from Public Works Department engineers at the Naval Supply Depot, Mechanicsburg, Pa. The examples cited below—plus other power-saving changes—net the base several thousand dollars a year.

1. Night duty for the pumps supplying the base's three 250,000-gal. water storage tanks has cut peak power demands. Peak summer demand for water runs 600,000 gallons daily, but average usage is only 200,000 gallons. To regulate the off-peak pump operation, calendar dial time switches were installed on the base's two 50-hp. pumps. They cost $129 in material and labor. But demand charges dropped about $37 a month as a result.

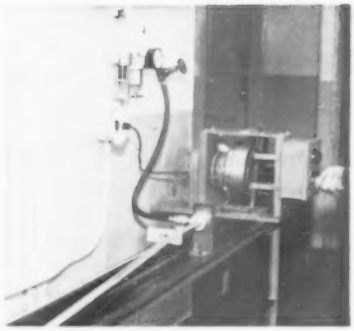
2. Eighty-eight dehumidifiers to control moisture in the base's 22 warehouses were also put on night operation. This way they still handle moisture removal adequately. But they cut power bills $12,000 annually by reducing the daytime peak demand 1000 kw. Here timers also have been installed to control operating hours.

A second look at the dehumidifiers cut the power bill another $5000 annually. By screening the chemical desiccant used, the Navy improved its moisture absorption properties. This change reduced machine load and cut average dehumidifier operating time by 25%.

3. Close inspection of power facilities showed two buildings had surplus transformer capacity. Each used two 200-kva. transformers but needed only one. Disconnecting one at each location saved $400 annually in power for core losses. Change cost about $100 in labor.

Torque Arm Acts as Shear Pin, Too

Shock loads are likely to cause equipment damage. But this shaft-mounted speed reducer simply spins around until somebody shuts off the motor and clears the jam-up. It drives a bucket elevator at A. E. Stone Inc., Pleasantville, N. J. Torque arm (which keeps the 20:1 reducer from turning) disengages driven equipment before damage occurs. Then the unit revolves around the axis. American Pulley Company engineers designed the drive.



Makes a Snap of Cable Assembly

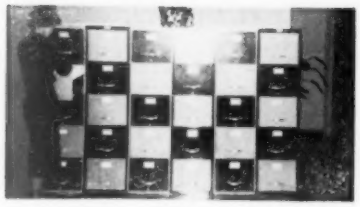
This motorized cable stringer solves a knotty production problem at American Bosch Arma Corporation. The operation consists of jacketing various lengths of coded wire conductors and cables with plastic insulating tube. Tubes contain up to a dozen wires and cables, range to 150 feet in length. Stringing wires by hand would be a ticklish and time-consuming job.

The new mechanism cost only $200. But it slashes labor. The old hand method took four men up to six hours to complete a 75-ft. length. Now two men can handle a 150-ft. piece in a half hour.

The tubes, resting in a long, narrow tray, are mounted and clamped over two hollow centers. One is fixed (photo), the other is movable to accommodate any length and draw it taut after clamping. Through the fixed center a bullet-nosed shuttle is introduced into the tube. Attached to the shuttle is a small-diameter, high-tensile-strength steel wire. This controls the speed of the shuttle through the length of the tube while air pressure (10 to 40 pounds) is applied.

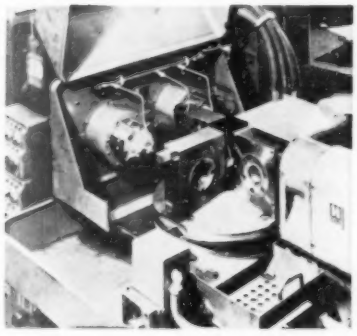
After the shuttle emerges from the far end of the tube, it's detached from the steel wire. In its place cable ends are fastened. Regulated air pressure, which is now applied at this end of the tube, removes all kinks, enlarges the tube to uniform diameter. Now the motorized reel shown above is able to pull the cable assembly through the tube with the steel wire.

Source: Joseph M. Berry, Manager, Tool and Process Department, American Bosch Division, American Bosch Arma Corporation, Springfield, Mass.



The Woman's Touch

The feminine touch in décor has invaded the Southwestern regional office of McGraw-Hill Publishing Company (Dallas). One-color filing cabinets with no eye appeal have given way to this checkerboard arrangement at the suggestion of the secretarial staff. It's created easily by alternating drawers of different colors. Result: more eye appeal, admiring comments from visitors.



No Operator Needed Here

A tricky four-station rotary fixture helps Whitin Machine Works (Whitinsville, Mass.) get 70% machine efficiency from a Heald Bore-matic. From a chute, roll sleeves feed into fixture, where both ends are precision-bored, faced, grooved. Then they drop into a waiting tote box untouched by human hands.

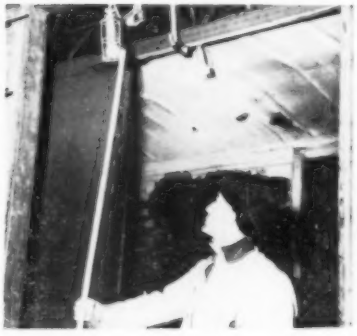
A hydraulic plunger inserts work from the loading chute into a collet chuck at one of four stations. In this same action the new piece ejects the finished one. On rotating 90 degrees, the table presents the work to the first boring head where one end is machined. Next rotation takes the work to an idle station, while the third brings it to the second-series cutting operations on the other end. At the fourth indexing the work is unloaded.

Clamps 'Em Tight in Seconds Only

Using air clamps to hold 200-lb. aircraft wing beams on a three-spindle profiling machine saves 40% on man-hours at Chance Vought Aircraft (Dallas). Company's tool designers developed the set-up to replace wrench-tightened clamps. New system, operated by five air valves for each beam, makes quick work of a time-consuming job.

Seventeen clamps hold each 11-ft. aluminum alloy forging. They're activated by a two-way air cylinder, use shop pressure of 90 to 100 psi. Turning a hand valve, color-coded to match clamps, tightens or loosens them. During operation the profiler machines inboard, outboard, upper, and lower surfaces of left- and right-hand beams.

The clamping system is designed into the machine, can be removed as a complete unit to permit milling of other parts. Added features include a safety mechanism using check valves and a pressure switch. And a red light flashes if line pressure drops below a safe level.



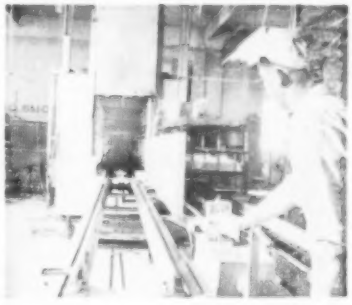
Tricky Light for Dark Job

Over 200 of these spring-action overhead loading lights are speeding freight transfer operations at the new Wabash Railroad Freight Terminal, Chicago.

Big advantage of this new look in loading lights is that there are no extension cords to get in the way of workers or materials.

The clever fixture is designed specifically for truck or boxcar dock loading by Pyle-National Company, Chicago. A telescopic device with gooseneck extension arm supports the wire-guarded light. Any worker needing light inside a truck or boxcar pulls down the extension arm, swivels it 180 degrees, then lets it snap back up inside the car. Spring tension holds the light in place but releases itself if the car or truck is moved. Vertical arm of the fixture has a swivel snap at the top. This way it's possible for a terminal employee to attach the fixture's vertical arm to a support bracket or to a messenger wire.

Electricians at the terminal say the lights give better illumination and are safer and easier to use than extension cords. And no time is lost hunting up cords to replace those that have been damaged.



Roof a Fifth as Thick

The new roof of this electric furnace is only 6 inches thick. It used to be 30 inches of solid fire-clay brick. With this reduced thickness Broome Porcelain Company of Toronto can raise the firing chamber 24 inches without extending the exterior walls of the furnace. New roof material is Foamsil silica block (Pittsburgh Corning Corporation, Pittsburgh).

Increased furnace height permits Broome to handle architectural panels up to 50x96 inches in the 40-year-old unit. And the insulation efficiency of the Foamsil, combined with its light weight (12 pounds per cubic foot) makes it possible to span the width of the chamber without using an arch.

Furnace operates continuously at temperatures ranging from 1400 F. while idling to 1600 F. in production. It's used to fire porcelain enamel finishes on reflector bowls, humidifying pans, architectural panels, other products.

GIANT FLAT CAR HANDLES BIG JOB

With this 250-ton capacity railroad car, General Electric can ship completely assembled giant transformers, have them ready for installation on arrival at the power site. The flat car is five times heavier than standard units and was made specially for GE's power transformer department (Pittsfield, Mass.) by Thrall Car Manufacturing Company (Chicago Heights, Ill.). Car is 88 feet long and rolls on 20 wheels, mounted on four trucks (two at each end). End sections are jointed to permit easy tracking around curves. The transformer rides on a low-slung, depressed center section, so it will clear tunnels and bridges easily.

Analyzer Gives Circuits Fast Check

Checking up to 1600 electrical circuits in an aircraft at one time sounds nearly impossible. But engineers at Lockheed Aircraft Corporation's Georgia Division have installed a new automatic circuit analyzer that does just that. Result is a big saving in time over the old method, by which a pair of inspectors checked circuits individually. This was a complicated process because many contact points were in uncomfortable, hard-to-reach places.

The new unit tests continuity, resistance, and potential on each circuit quickly from outside the aircraft. Thus malfunctions can be noted right on a circuit diagram mounted on the detector panel. This way, repairmen can trace and correct defects faster. In a typical test of a fire control system with 318 circuits, the circuit analyzer cut test time from 14 hours to 6.

Secret of the analyzer's success and flexibility is punch-board panels. These resemble similar units used to program tabulating machines. By simply plugging different panels in the analyzer, inspectors quickly shift testing from one circuit to another. Each different wiring system requires one or more of these boards.

To take full advantage of the analyzer, Lockheed changed some circuitry to provide convenient cable extensions for quick connections. And set up a position in the production assembly line solely for continuity testing.

Analyzers (DIT-MCO Inc., Kansas City, Mo.) cost up to $11,750, depending on circuit test capacity. Payoff can be less than six months, says Lockheed, if all testing can be converted to the automatic analyzer at once.

Club Helps Oldsters Plan Retirement

Helping elderly employees get all the information they need for a successful, happy retirement is the aim of the Five-Year Club at Union Carbide Corporation's Linde Company. Club membership is limited to any employee between 60 and 65. It meets quarterly on company time. Meetings are informal, usually last an hour. The president is elected by the members.

All topics discussed at meetings relate to retirement. Examples include social security, health after retirement, and what the retiree can do with his time. Speakers are company people or outsiders, depending on the subject. The club sponsors no other activities.

Linde's industrial relations manager acts as permanent secretary of the club, handles all arrangements for meetings. This indicates the company's interest in this activity and insures continuity in the club's operation.

Employees seem to like the club —and the idea. At least they don't resist going to meetings. In fact, many are quick to remind the industrial relations department when they're eligible to join.

Source: E. H. Eder, Industrial Relations Manager, Linde Company, Division of Union Carbide Corporation, Newark, N. J.

Combines Two Operations in One

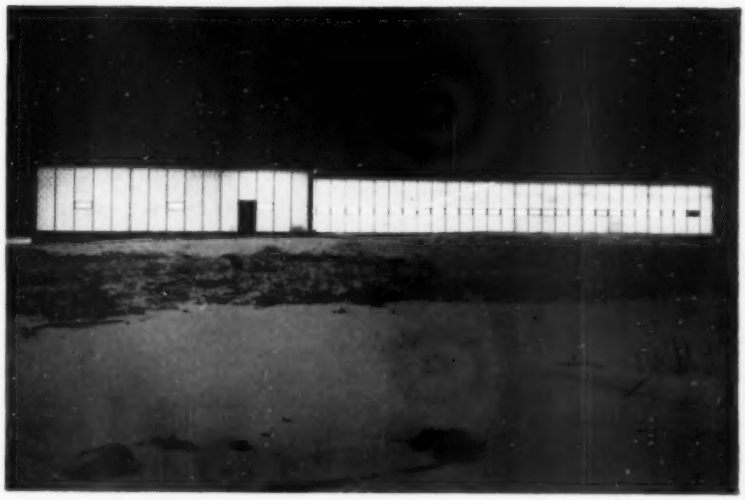
How about combining operations from two departments into one work center for a 45% saving in over-all production time? That's what Hobart Brothers Company (Troy, Ohio) did. Put a semi-automatic punch press

next to a semi-automatic carbon dioxide shielded arc welder. And changed from manual stick electrodes. This cut the welding cycle on transformer core pieces 62%.

With the new set-up, 26-gage electrical sheet steel comes to the press in 2240-lb. coils. From an automatic centering reel, coiled stock feeds through a continuous straightening machine with mechanical speed variations to the press. Operator starts and stops the blanking press with a pedal. Blanked core laminations are forced up a conveyor rack that's attached to the bottom of the press.

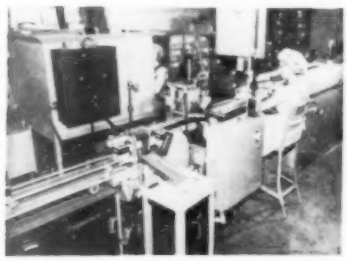
Next, the single operator secures the L-shaped laminations in a pneumatic fixture with duplicate sides joined by a pivot. Then one of Hobart's own semi-automatic machines welds the cores at a speed of 14 inches per minute. With manual stick electrodes, speed was only 9 inches per minute.

Consolidation of these operations jumped daily production from 25 to 45 units. Also it reduced materials handling costs and eliminated a punchpress operator. Completed core are next transferred to the adjoining winding department.



SHINING EXAMPLE OF NEW PLANT DESIGN

This factory literally glows in the dark. On sunless days, a soft glareless light is reflected inside through the translucent walls. It was built by Edburgh Manufacturing Corporation (Newburgh, N. Y.), which was inspired by the U. S. Brussels Fair pavilion. Walls are made by Kalwall Corporation (Manchester, N. H.) of prefabricated lightweight fiber glass bonded to both sides of an aluminum grid. Panels need no supporting framework, come with any number of windows, doors, or vents, in soft colors or opaque with colored inserts. Walls are set into floor and ceiling tracks, then joined. Four men can erect a 100-yd. wall in four days.



Scales Check Box Contents

Two-way weighing makes sure boxes hold what they're supposed to at Delco-Remy Division, General Motors Corporation (Anderson, Ind.). Each small package contains a set of contact-point components. Since it would be too time-consuming to check packages visually, a weight check does the job fastest.

First check comes after individual sets of points are packaged. Riding an endless belt, packages pass through a Selectrol unit (right). This cabinet-enclosed unit checks a box per second. Correct-weight packages pass on to a stacker. But any weight variation greater than three grams automatically triggers a reject gate. Weighing operation catches any omission—even a point weighing less than an ounce. Packs rejected here are repackaged with the correct number of parts.

Units then pass to a stacker that binds 10 units together. Here an Exacto scale checks the 10 packs for proper weight, automatically rejects packs with less than the specified number of packages. Small-package rejects average about 12 an hour; shipping-unit shortages, one a day. Both weight-checking devices are products of Exact Weight Scale Company, Columbus, Ohio.

Speeds Brazing of Honeycomb

A new furnace is the key to continuous brazing of stainless steel honeycomb panels at Temco Aircraft Company (Dallas). Resulting savings in material means more is available for extensive application in high-speed weapons systems.

The big saving in the new process (developed by Temco) comes from the elimination of huge, expensive furnace installations, carbon blocks, and long lay-up times that are associated with the usual batch methods of production.

Company engineers used simple components in designing the gas-fired, infra-red brazing enclosure with its roller system. And the new furnace can handle panels of almost unlimited size, including a single-contour configuration.

The basic principle is simple: If assembled sandwich panels can be heated uniformly and at the same rate throughout, they can be run through the brazing cycle without significant warping. And that's just how the process works.

During the automatic movement the heating element successively pre-heats, brazes, and heat-treats panels. Pre-heating is accomplished at 1100 F., brazing at 1750 F. Following brazing, the panels are stretched to the right proportion, supercooled to —100 F., and aged at 905 F. Temco engineers have processed panels at speeds up to 18 inches per minute. But normal speeds range between 6 and 8 inches per minute.

1. X-ray shows up metal flaws

2. Hypo quenches electric arc

3. Model helps analyze stresses

4. Switch parts look like leg

5. Stethoscope hears trouble

6. Masks protect metallurgists

Men of Medicine? No, They're Engineers

Are they doctors or engineers? Despite the medical look, they're engineers. And they're performing production, inspection, and research tasks at various Westinghouse Electric Corporation plants and laboratories. The incredibly precise and painstaking operations they perform assure quality products at competitive prices. It took the sharp eye of a Westinghouse photographer to dramatize the increasing similarities between medical practice and industrial practice.

Just what are the men doing? Let's take the photos and see.

1. Finding faults—X-ray pictures are the only acceptable technique for finding minute internal faults or voids in these castings. They're blades for turbines. The inspection takes place at the Blairsville (Pa.) Westinghouse Metals Plant. Here, using x-ray photographs for inspection of critical metal parts (such as jet engine and steam turbine blades) is standard practice.

Although there are other equally satisfactory methods available for searching out external casting faults, Westinghouse relies solely on x-raying for internal sleuthing. For such high-temperature, high-stress applications, even the tiniest defect sends a component to the reject pile. Blairsville's x-ray facilities are extensive enough to inspect any part made by shell or investment casting processes. If necessary, the entire output of both processes can be inspected by x-ray.

2. Breaking a circuit—The scientist with the poised syringe is injecting a small amount of sulfur hexafluoride gas into an electric arc (or short circuit). The gas has the peculiar quality of "soaking up" the electrons composing the arc. This provides a visual demonstration of the effectiveness of the hexafluoride gas as a circuit breaker. The action takes place at Westinghouse's Central Research Laboratory near Pittsburgh. Although the equipment shown is for demonstration purposes, the actual circuit-breaking operation is identical in function to the one shown.

3. Analyzing stresses—This research scientist is examining by photoelasticity a plastic model of the human thighbone that has been used in stress studies. This experimentation method covers a wide range of real objects, scale models, designs of unusual shapes. The "bone" is subjected to various stresses under heat. These stresses are then "frozen-in" by cooling the bone. Under polarized light the stresses reveal themselves in well-defined color patterns. This enables researchers to read the degree and extent of stress in a given area, keep the designers up-to-date on optimum shapes for new machine and equipment parts. On the basis of this sort of research, Westinghouse can design complex, stress-free parts with confidence.

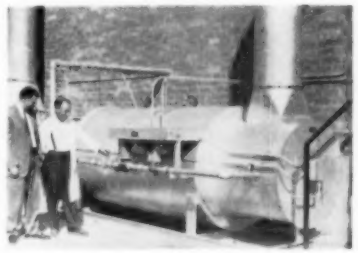
4. Building switches—This assembly worker seems to be adjusting a kneecap on a metal leg. But he's actually adjusting a complex part of a high-capacity electrical switch. The "shinbone" is a hinge casting, the "kneecap," a cam housing. Both are used in disconnect switches. They're made of a copper alloy.

The hinge casting supported by insulators functions like a lever arm. Switching action takes place within the cam housing. When the "ankle" end of the hinged casting is raised, a cam action takes place within the housing to make or break the circuit. It's only chance that gives an appearance similar to artificial limbs. Bending angle, incidentally, is opposite from the direction in which the human kneecap bends. The housing is supported by the hinge casting on one end, by a third insulator at the other.

5. Listening for rubs—The man with the special stethoscope is trying to hear metallic rubs or any other malfunction inside an operating, canned motor pump. The stethoscope has a super-sensitive diaphragm and probe. This helps a trained ear determine the exact nature and location of a malfunction within the pump. The operation is taking place at Westinghouse's Atomic Equipment Department, Cheswick, Pa.

Three pumps are completely sealed and normally very quiet in operation. But with the smaller canned units, the ear cannot determine whether or not the pump is even running. To insure proper operation each is tested under simulated reactor conditions, before leaving the plant. Photo shows an Atomic Equipment Department quality control inspector tuning in on a large unit.

6. Moving a hot cargo—Although the unusual camera angle in this photo suggests a patient's eye view of an intent operating team, these men are really metallurgists. Object of their concentration is a shipment of nuclear fuel pellets manufactured at Westinghouse's Blairsville plant. The man with the rubber-gloved hand is holding the probe of a Geiger counter. This checks the shipment's radioactivity count. Respirators are worn by the men to guard them against the toxic effects of the compressed uranium oxide.



New Incinerator Gobbles Up Smog

Micron-sized hydrocarbon particles —the by-products of vulcanizing— can't get past this efficient vapor incinerator at Armour & Company's Cushioning Products Division plant (Los Angeles). Potential air pollutants are burned up in the incinerator's 900 F. heat.

In smog-conscious Los Angeles (as in many big cities) local law forbids exhausting combustible contaminants. Thus Armour set about throttling its hydrocarbons. The new system depends on an induced draft to carry fumes from vulcanizing ovens directly to the incinerator (Hirt Combustion Engineers, Montebello, Calif.). The burner temperature is high enough to burn all hydrocarbons in fumes and smoke.

It costs only $125 a month to run the system, $8000 to install. Also

the incinerator has many built-in safety features. It will shut itself off whenever . . .

- There's no product in the oven for several minutes.
- Fan motion fails.
- Stack temperature exceeds a safe limit.
- Temperature-control thermocouple breaks.
- Pilot burner fails to burn properly as sensed by the combustion safeguard relay.

Cost Cutters Get Fast Action

Cost improvement proposals (CIP's) get fast handling at the Arma Division of American Bosch Arma Corporation (Garden City, N. Y.). Ideas involving cost savings from the employee suggestion plan, as well as cost improvement proposals from administrative and supervisory personnel, funnel directly to a six-man Cost Improvement Committee. This group screens all suggestions and authorizes installation of accepted ideas. Here are the details on how the committee operates:

- The Cost Improvement Committee chairman is the manager of industrial engineering or his representative. Other representatives to the committee come from accounting, manufacturing, product design, tool and process engineering, and quality control. In addition, the chairman of the plant's suggestion committee is an *ex-officio* member.
- The committee meets once a week at a regularly scheduled time. But the chairman can call a special meeting at any time.
- The committee considers each proposal on the basis of information and a cost analysis presented by the chairman. The committee has the power to accept or reject any idea, or request further data.
- Upon acceptance of an idea the chairman prepares a letter of acceptance to the appropriate department manager for presentation to the originator. If a CIP originates from the suggestion system, the employee relations department is told.
- Next, the chairman initiates installation of the proposal. Meanwhile, members of the committee are responsible for coordinating action in their departments.

THIS TINY UNIT GUARDS . . .

THESE TELEVISION SETS AND . . .

Spots Fire Before It's Visible

The continuous test area for TV sets at its Metuchen (N. J.) plant is one place Westinghouse Electric Corporation doesn't want a serious fire. That's the "why" of a new detection system that spots the fire before it gets started—even before sprinkler heads are activated.

This new system detects trouble so soon because it doesn't depend on a rise in temperature. The presence of combustion gases and smoke —without sensible heat or flame— will set it off. This is accomplished by strategically located ionization-type detector heads employed by the system called Pyr-A-Larm (Pyrotronics Division of Baker Industries, Newark, N. J.) Five of these heads guard the 8000-sq.-ft. sprinkler-protected TV test area. They flash signals if trouble develops to the system's indicating panel and alarm in the plant protection office some 300 yards away. Normally the heads are ceiling-mounted, but in the TV test area one detector is mounted under the counter.

Now here's a brief rundown on how the Pyr-A-Larm system works:

Each detector head (about the size of a small vegetable can) contains two ionization chambers and a cold cathode trigger tube. Each ionization chamber contains two electrodes. The space between the electrodes is ionized by a stream of alpha particles emitted from a small amount of radium-bearing foil. This makes the air within the chambers conductive. One chamber is open to admit air from within the room; the other is shielded. Electrodes of the two chambers are connected in series with a sensitive relay and a 220-volt d-c source. A trigger tube is in parallel with the two chambers, and a starter electrode is connected to the midpoint between the chambers. When everything is normal a small fraction of a micro-ampere flows through the circuit. This is not enough to trip the relay, and no current flows through the tube.

When a small amount of smoke or invisible gas from any kind of combustion reaches the open detector chamber, conductivity drops and the voltage across it rises. This is because combustion gases have large suspended particles that cannot be ionized (and made conductive) readily by alpha particles.

As voltage across the detector chamber rises, it causes the cold-cathode starter electrode to fire, making the tube conductive. A heavy current flows through the relay, trips it, ringing an alarm and flashing a light at the indicating cabinet. Each detector head can be adjusted so it won't trip from normal atmosphere contaminants.

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.

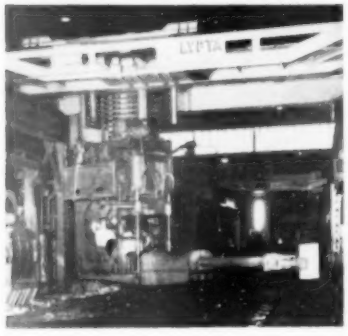
Panel Dramatizes Selection Methods

How the management selection committee works is no longer a mystery to employees at Lockheed Aircraft Corporation's Georgia Division at Marietta. To make the procedure crystal clear for any interested salaried employee, a panel of managers (photo) staged a typical selection session. Played to an audience of roughly 500.

The company's Management Club sponsored the show. The panel was only a part of the four-part program. First, employees heard a brief history of the division's management selection and development program. Next, they learned something about testing and its effectiveness as a selection aid.

Then the panel of managers took over, presented two different situations to the audience. One called for filling a management vacancy, the other for a reduction in staff when a surplus of managerial help occurred. In each situation, performance and historical data on a number of men were made available to the selection committee. After realistically comparing the strong and weak points of the men, and after due discussion involving some disagreement, the committee finally made its decisions. During this part of the program the need to make decisions in the light of over-all organizational strength was emphasized.

Last act on the program was a talk on Lockheed's new Management Advancement Plan. This plan calls for performance evaluation of each individual. Then the manager and his superior work out long-range development plans based on the findings. But it is up to each manager to take his own steps to improve and develop his subordinates' performance.



A Mechanical Claw for Hot Billets

This crane-hung device handles white-hot billets with the greatest of ease at Cameron Iron Works. Also it's about 10% cheaper to maintain than older track-mounted units. Processing downtime has all but vanished.

The problem: Cameron used track-type manipulators to service several 5000-, 4000-, and 1500-ton forging presses in one section of its forge shop. These units have capacities just under 3000 pounds. But their complicated design and the underfloor location of conductors made maintenance difficult, jacked costs sky-high. So Cameron decided to redesign the units.

Working with the Lypta Company (Houston), Cameron designed and installed two traveling bridges to support 20-ton cranes on a 200-ft. craneway running between forging presses and furnaces. But—unlike a conventional craneway—these support the movement of the new manipulators in all directions.

Next problem was to design the ideal manipulator. The product of careful planning (photo) has a 4000-lb. capacity at end of the ram, rotates 360 degrees as a unit. Ram can also rotate 360 degrees, has a 72-in. lift and drawbar pull of 30,000 pounds. Operator controls all moves from his cab. Bridge speed is 325 fpm.; trolley, 150 fpm. Rotation speed is 7 rpm., lifting speed about 1 foot per second. Total investment (craneway and two manipulators): about $150,000.

Source: A. E. Caldwell, Plant Engineer, Cameron Iron Works, Houston, Tex.

12 Training Programs in 12 Nutshells

If you've been thinking about an industrial relations training program for shop supervisors in your plant, you'll be interested in the experiences of these 12 Cleveland companies. Research for this rundown was done by the Associated Industries of Cleveland. At its request, the companies participating will remain anonymous.

Company 1—Holds industrial relations training classes for supervisors during and after working hours. Material covers labor laws, (including Taft-Hartley), company's contract, methods of handling grievances, arbitration, human relations. The arbitration course details 20 arbitration cases, including the arbitrator's decision. But before each decision is revealed the class discusses the case, forms its own opinion on the decision. Then the supervisors hear the arbitrator's decision and his reasons.

Company 2—Has supervisors attend industrial relations training

YOU BE THE ARBITRATOR

THE CASE OF

The Wrong Call-In

Out of the experience of the American Arbitration Association

When the foreman of the midnight shift in a steel fabricating plant walked through the shop one night, he noticed one shear operator had failed to report. Because of a heavy schedule, he decided to phone another operator, let him work a few hours overtime before the start of his regular day shift.

Trouble was, he called a worker whose number he knew—and who lived near the plant. But this worker didn't happen to be the senior man on this operation. This led to a grievance based on a contract clause reading this way: "In the distribution of overtime, seniority will be observed within each employee's ability to perform the available work."

The company defended the foreman's action on two grounds. First, it was an emergency, since the night-shift shear operator had given no advance notice that he would be out. Second, personnel records were locked up during that shift, so the foreman couldn't refer to the seniority roster.

Eventually the case went to arbitration. Suppose you were the arbitrator. How would you rule?

For the actual decision turn to page 134

classes covering grievance administration and the union contract. Human relations are covered only briefly. It's considered a difficult subject to teach because of differences among supervisors.

Company 3—Makes labor relations an important part of its supervisory training program. The entire program takes a year to complete. The material is divided into units, each unit requiring seven weekly meetings. Metings last three hours —from 9 a.m. to 12 noon—for the 12-man group. Upon completion of each unit the president of the company presents certificates to members of the group. Typical units cover labor relations subjects, the development of managerial performance standards, and human relations.

Company 4—Boasts that its management is enthusiastic about the program. Meetings are on labor laws including Taft-Hartley, how to work with people (considered of primary importance), and other subjects to improve supervisory performance. Supervisors meet in groups of 20 to 25 for one-hour sessions. Frequency depends either on need or on the unit involved. These discussions bring out material that helps company negotiators.

Company 5—Is a multi-plant operation with supervisory training in all divisions. The staff at the home office prepares programs, and local plant managers apply them to their divisions. Supervisory meetings are held on Saturday mornings or late in the afternoon of working days. Meetings last one to two hours. Material includes labor laws, basic economics, principles of supervision, union demands, and an explanation of negotiated changes in contract.

Company 6—Supervisors meet in groups of 12 to 15 before and after contract negotiations. This company recently started a series of meetings on subjects other than industrial relations; for example, incentives and work simplification. Frequency and length of meetings depend on material presented.

Company 7—Labor relations training classes are held for supervisors in groups of 12 to 25. About 95% of the meetings are held on company time, last an hour or longer. Material for the courses comes from outside sources and from within the company. Length of programs varies from 6 to 10 weeks. Subjects include contracts and their interpretation, human relations, and business economics.

Company 8—Sponsors two human relations courses—one basic, the other more advanced. Course leader is a professor from a nearby college who visits the plant every other week to conduct the courses for three classes of 15 to 20 supervisors. Meetings are held on company time. Courses require a year.

Company 9—Devotes 60% of the material presented in its supervisory training program to industrial relations. Attendance is compulsory. Subjects are fringe benefits, personnel policies, new labor contract discussions, grievances, morale, communications, company insurance, competition. Company uses films to aid in the training process.

Company 10—Has been conducting a training program for supervisors and group leaders for the last two years. The company uses outside courses offered by its employers' organization and a local college as the basis for sessions in the plant. A panel (the superintendent, training director, and his assistant) plans the course content. All subjects are related to human relations and industrial relations.

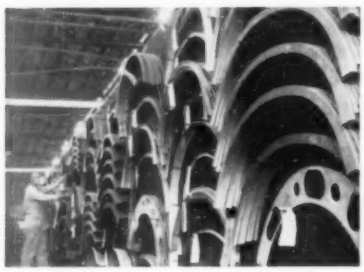
In addition, meetings for foremen are held to study industrial engi-

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

neering subjects and wage incentive programs. Every three months a group of 40 foremen attend a dinner, hold a production conference afterward. These dinner meetings will eventually be supplemented by meetings in the plant for smaller groups of about 20. Coffee and sandwiches will be served, followed by a conference-type meeting on production and industrial relations.

Company 11—Holds meetings once a month on company time for periods of not longer than 1½ hours. Subjects include shop problems, human relations, grievances, and the union contract.

Company 12—Has an industrial education course for all management personnel, including foremen. Material includes human relations, industrial relations, and the union contract. The company also has a course for young men who may become supervisors and a 40-hour orientation course for new supervisors. Average group size is 20.



Odd-Shaped Parts Hang From Wall

Space-saving pegboard walls, like the 640-sq.-ft. one above, braced by re-usable metal angles, facilitate storage of these odd-shaped parts at Ryan Aeronautical Company (San Diego). Ordinary shelving was inadequate, devoured floor space, and was costly. It's estimated that a $6.80 sheet of pegboard affords more storage space than can be had with a $37.50 metal shelf.

The 80-ft.-long wall-panel storage uses the same principle as a child's erector set. Slotted, perforated sheet-metal angles are easily assembled to form an infinite variety of structures. The material is completely interchangeable, can be dismantled and re-used over and over. Then the pegboard is attached. Specially built plastic-coated steel hooks hold parts in place without interfering with production activities, but within easy reach. In the past, similar holding and storage units have been of welded construction and not re-usable.

Totem Poles Tot Up Safety Records

Low man on the totem pole represents the department with the poorest safety record at Shulton, Inc. High man is the department with the best record. Shulton has two poles (made by Organization Services, Inc., Chicago). One is for production departments, the other for production supporting departments. Poles are always on display in the plant cafeteria.

Standings are re-calculated monthly for the current calendar year. They're based on number of accidents in relation to number of man-hours. But special consideration is given to the potential severity of hazards, as the rating scale below shows. A department gets . . .

- Three to five points for eye injuries, chemical burns, poisoning.
- Two to four points for injuries from machine or mechanical materials handling.
- Three points for falls.
- One to three points for injuries from manual handling, striking against objects, hits by falling objects, and burns other than chemical.
- One to two points for cuts from glass or hand tools.

Each department's monthly accident score is then divided into the man-hours worked. As a permanent record at accomplishment, winning departments also get plaques.

Source: James E. Ennis, Safety Coordinator, Shulton, Inc., Clifton, New Jersey.

CASE BOOK CAPSULES

Temporary covering enabled Union Lumber Company (Ft. Bragg, Calif.) to use heavy-duty tractors while new concrete floor was being cured. Avoided a six-month delay. Loose panels of Masonite ¼-in. Tempered Prestwood did the job.

Electronic computer tells size of air conditioner required. Just feed facts to computer (Westinghouse Electric Corporation, Pittsburgh). It will analyze them, produce answer in 24 seconds.

Six cyclone collectors combined into one giant unit will collect dust from an iron ore sintering machine at Youngstown Sheet & Tube Company, East Chicago, Ind. The unit (American Standard, Detroit) is rated to handle 300 F. gas at 375,000 cfm.

Marking its machines with name and price serves twofold purpose at Arvin Industries, Inc. (Columbus, Ind.). Makes employees maintenance-conscious. Gives facts to visiting firemen.

Engineering student enrollment is declining, says the American Society for Engineering Education at the University of Illinois (Urbana). Its annual survey shows that last fall's freshmen in 153 accredited engineering colleges were 11.6% under 1957.

Heat flow in building materials is measurable with a special analog computer. Estimates the fire endurance of structural elements, according to the National Bureau of Standards, Washington.

One-minute color test developed at Mobay Chemical Company (Pittsburgh) differentiates between polyether- and polyester-based urethane polymers. Test involves interaction of four chemicals.

Construction of corrosion-resistant glassed steel reactor (7150 gallons, 166 inches high) was a problem for Pfaudler Company, Rochester, N. Y. It was solved by firing the vessel in vertical position.

LIKE FITTING AN ELEPHANT INTO A THIMBLE

Are you trying to squeeze a huge amount of filing capacity into a thimble-sized office? If your files have taken on elephantine proportions and you're begging for space, consider installing mobile cabinets. Here the two front rows ride back and forth on tracks. The rear one remains fixed. Eastman Kodak Company's Apparatus and Optical Division (Rochester) stores tool-design plans in this filing system built by Dolin Metal Products, Inc. (Brooklyn). Permits maximum use of small storage area but still provides easy access to all drawers.

Keeps Naphthalene Flowing in Pipes

These pipes are treated with Thermon, a non-metallic plastic compound with highly efficient heat-transfer properties. It's keeping liquid naphthalene flowing through them at over 80 C.—freezing point for this material. Now The Standard Naphthalene Products Company is no longer plagued with pluggages in its process lines due to freezing.

The 2- to 3-in. lines are steam-traced with ¼- and ½-in. copper tubing. But this wasn't enough to prevent the naphthalene from freezing, especially in cold weather. And when it solidified, causing pluggages, lines and valves had to be dismantled and cleaned before resuming production. This boosted maintenance costs, cut production.

Over a year ago Thermon (Thermon Manufacturing Company, Houston) was applied to about 1500 feet of pipes, valves, strainers, and pumping equipment. It was troweled on over the steam tracing, then covered with 1½ inches of insulation Since then there have been no shutdowns due to naphthalene freeze-ups.

Source: Andrew Bagdasarian, Plant Engineer, Standard Naphthalene Products Co., Kearny, N. J.

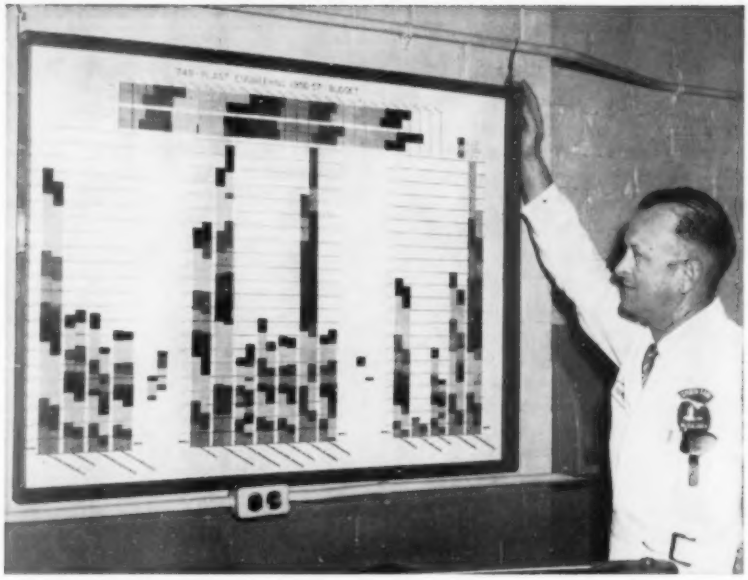
Cuts Weight of Pack by 54%

Why not ship 3500-lb. control panels in corrugated paper? That's the question General Electric Company shipping specialists asked themselves at the Roanoke, Va., plant. With this change, an 88-lb. corrugated pack can replace the 190-lb. wood crate used previously for each control panel. Result is a 54% across-the-board saving in material, labor, and shipping weight.

Panels for shipment are first placed on a skid. Then 4-in. blocking formed from slit-scored sheets, folded accordion-fashion, is taped to the front of the panel to protect handles or control levers. Next, multi-scored sheets are bent to fit the panel depth. On smaller panels the end-sheet flaps overlap on the front and back of the panel. But as panel widths increase, filler sheets are added to cover the space where flaps don't meet. Staples secure the corrugated sheet to the skid and four equally spaced steel bands complete the pack.

Model Solves Nuclear Problems

This scale model is helping engineers and scientists visualize problems in the design of a nuclear power plant. Here two engineers of Stone & Webster Engineering Corporation (Boston) discuss features of the nuclear steam generator inside a 125-ft.-diameter steel sphere. Model is fashioned after the Yankee Atomic Electric power plant. It's helping solve problems of piping flexibility, drainage, shielding, manpower access, missile protection, and accessibility of valves and equipment for maintenance. Mechanical engineering and structural design can also be coordinated with the model.



Budget Chart Tells All at a Glance

Carefully planned visual aids can help keep supervisors aware of important management goals. A good illustration is this "plant engineering budget" chart at the McCulloch Corporation. It hangs in the plant engineering office. It's enclosed in a 2½x3¼-ft. black, glass-faced frame so it's easily visible and accessible to all plant engineering people.

The chart shows clearly how close the plant engineering department holds to its current annual budget. It provides a continuing comparison of estimated budget *versus* actual expenditures during the current fiscal year. The chart was devised in 1956 in response to a management request for company-wide curbs on unnecessary spending. A visual presentation was considered the best way to make plant engineering supervisors more cost-conscious and point up variances before they get completely out of control.

How well did the chart fulfill expectations? There are no statistics to prove anything. But in 1956 the department kept within budget right down the line. And in 1957 and 1958 it was toeing the mark. There's one fact you can't overlook: With the budget report in full view every minute of the day, supervisors consider the figures a challenge, take pride in staying within them in each category. And there's another advantage. Both the plant engineer and his supervisors have only a limited time available for individual or group briefing. Thus the chart keeps supervisors well informed without infringing on their time. A supervisor can study it at his own convenience. And the time saved can be used productively on various other jobs.

How it's set up—The chart breaks the department's budget into 18 cost categories. Two are horizontal, 16 vertical. Each category is represented by two adjacent bars. One bar shows the amount of money budgeted, the other expenditures to date. Thus the status of budget performance—whether "under" or "over"—is evident at a moment's glance.

Each of the category bars is divided into 12 segments, each representing a calendar month. As you would expect, these segments represent what the company expects to spend, or has spent, during a given month on a particular plant engineering function. Thus the supervisors get a monthly as well as a cumulative budget comparison. To show monthly performance, a code of six colors is used to identify each month in the first half-year and repeated in the second half. (Reason for the repeat is that colored tape used is not available commercially in 12 distinctive colors.)

You'll note that only monthly and accumulative totals to date are shown on the chart. Why not show annual budget right from the start, as you see it in money-raising drives? Because this isn't a money-raising effort—it's a keep-down-the-rate-of-spending checkrein. Giving a person a year's allowance at the start is likely to encourage overspending early in the game.

What the bars show—Now here's what the 18 sets of bars on the McCulloch chart represent. The two horizontal sets (top) illustrate gross department expenses and transfers and direct charges. The first group of the 16 pairs of vertical bars covers direct hourly projects, janitorial, maintenance materials and supplies, and added payroll costs. The second group includes oiling, salaried supervision, salaried staff personnel, clerical and other salaried people, hourly supervision, coolants and lubricants, and janitorial supplies. The third group completes the rundown with storekeeping, other hourly labor, lost time, shift differential rate, and overtime hourly premiums.

Reason for grouping the listings is that they vary in the amount of annual expenditure from $500 to $80,000. Thus to get all listings on a single chart they're arranged in groups using different dollar volume scales.

The first vertical scale lists costs to $220,000 in $10,000 increments. The second, to $44,000 in $2000 increments. And the third, to $11,000 in $500 increments. As each month is added, the exact cumulative dollar amount is noted at the top of each column.

The two horizontal sets of bars represent two important totals of expenditures. The top one sums up all 16 sets of vertical bars covering all maintenance and repair activities for building and grounds. This expenditure is a direct responsibility of the plant engineer. But plant engineering also provides services to operating departments by maintaining and repairing all equipment and facilities. These costs are charged to operating departments by direct charges or by transfers of charges (such as machine parts) originally made to plant engineering. (Sometimes the transfer works the reverse way, as when materials charged to a storeroom are used by plant engineering.)

The plant engineering budget

covers only maintenance and repair, not new projects. Budget amounts are calculated in dollars for labor and material expenditures, without adjustment for company overhead. This keeps it workable, simple.

Source: H. M. Eversz, Plant Engineer, McCulloch Corporation, Los Angeles.

Can't Trip This Control Switch

Accidental tripping of circuit-breaker control switch handles just doesn't happen at Chrysler's Detroit Plymouth Assembly Plant. A 4-in. V-channel (flat side out) with a 1½-in. web sees to that. Channel keeps employees and machinery from brushing against the handles, which are located at a uniform height above the floor.

The primary control panel in question (photo) faces a narrow, frequently used aisle. The channel is welded to brackets, which in turn are bolted to the ends of the switchgear line-up. A 6-in. clearance between panel and channel enables Plymouth's maintenance personnel quickly to reach handles for tripping when necessary.

Source: H. H. Hunt, Plant Electrical Engineer, Plymouth Assembly Plant, Detroit.

Two Companies Up Retirement Age

Must the mandatory retirement age remain unchanged? Two companies have said "No." And they've successfully changed their retirement plans to boost the age of mandatory retirement, according to the National Committee on the Aging (New York).

American Cyanamid Company, with 45 operating units and 27,000 employees, amended its pension plan in 1957. The new approach permits employees earning under $7500 a year to keep working to age 68 on certification by the medical department of physical fitness. But normal retirement age is still 65.

Of 158 employees who became eligible for retirement between July 1, 1957, and Dec. 31, 1958, 66 elected to remain at their jobs and were acceptable to management. Of this number 31 have since terminated employment. Cyanamid Personnel Manager R. P. Fisher feels the tradition of retiring at 65 has influenced results so far.

Consolidated Edison Company, a New York utility, changed its policy effective Jan. 1, 1958. It raised mandatory retirement age for women from 60 to 65; for men, from 65 to 68. Normal retirement age remains at 60 for women and 65 for men. Here an employee at normal retirement age may retire with full pension benefits or continue in his job until mandatory retirement age, provided his employment is acceptable to management.

Of 560 employees affected by the new option in 1958, 207 (37%) elected to stay on the job and were acceptable to management. Most retirees were employees on operating shifts or those with duties involving substantial physical effort. Most retentions included engineers, technicians, testers, business representatives, clerical workers, attendants, watchmen, and guards.

"It does not surprise us that the majority of workers in some categories want to retire while the majority in other categories want to continue working," said Dwight S. Sargent, personnel director of Consolidated Edison. "What seems significant to us is that in every category there are some who want to do one thing, some another.

"We found 20 of 113 operating shift employees wanted to stay on the job, despite the rigors of day and night shifts, while 15 of 37 attendants, watchmen, and guards elected to retire.

"As long as company management retains its prerogative of judging the competence of each worker's job performance, we think it is a good thing for employees to have this kind of choice."

YOU BE THE ARBITRATOR

Continued from page 130

The award—The decision went to the union. First, the arbitrator ruled out the "emergency" angle. He said it was not an emergency within the usual meaning of the word but an ordinary circumstance covered by contract seniority and overtime provision. He also ruled the company must take the blame for not making the seniority list available to the night-shift foreman. Added that when a commitment is made by an employer, it is incumbent on him to provide supervisors with a reasonable means of carrying out the letter and intent of the provision.

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Straying Parts Sound Own Alarm

An electric-eye warning system eliminates collisions of parts on two overhead conveyor lines at the Thatcher Furnace Company (Garwood, N. J.). This arrangement removes the danger that falling parts will injure workers or get damaged.

The warning device is several feet from the intersection of two conveyor lines near the final assembly line. The upper line carries finished steel panels. The lower transports heat exchangers.

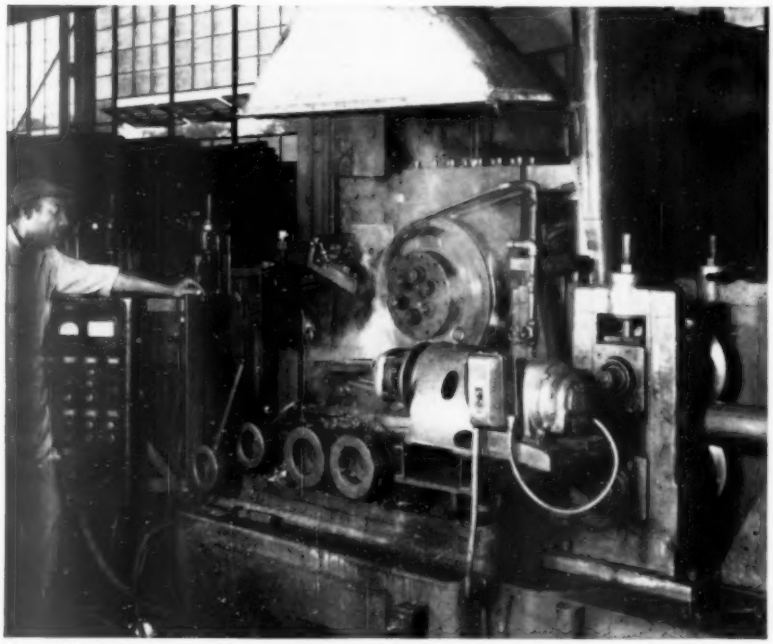
If an errant panel crosses the beam of the electric eye, an extra-loud brass horn sounds the warning. This summons a workman from the nearby assembly line to remove the steel piece from its hook.

first in silicones

Dow Corning

SILICONE NEWS

production and maintenance edition • No. 28



NOW: MOISTURE-PROOF INSULATION

If your motors or transformers are failing due to moisture, here's good news for you.

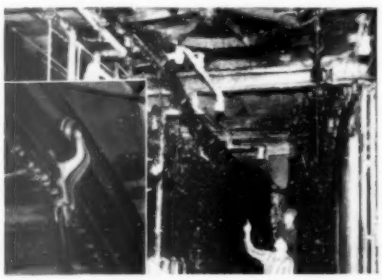
American Metal Products Company of Detroit makes automotive torque tubes and rear axle housings. In the process, flat steel stock is resistance-welded into tubes on Yoder Tube Mills. Rotary transformers supply current for the welding. These 600 KVA transformers are subject to unusually severe moisture attack from two sources: a stream of water that cools the welding rolls, causing direct spray, steam, and high humidity; and seepage from a water jacket used to cool the transformer itself.

As a result, transformer failures were too frequent. In one case a primary coil failed to ground after only eight days. Though a spare transformer was kept in reserve, it took 24 hours for replacement. This meant lost production . . . extra labor cost.

American Metal Products engineers authorized Howard Electric of Detroit to test various insulation systems with a laboratory "water torture". Coils were immersed in water, then subjected to high voltage. All systems failed but one.

The one? A silicone system based on Silastic®, the Dow Corning silicone rubber. In this system, a Silastic paste is first coated on the coils to get a smooth surface. Next, the coils are wound with a self-adhering tape made of Silastic. This tape has excellent heat and moisture resistance, and seals itself. The Silastic is then over-wrapped with glass tape, and the whole assembly impregnated with silicone varnish. Coils thus insulated passed every water torture-test.

So American Metal Products had Howard Electric re-insulate a transformer with a complete silicone system. Company engineers were so pleased with its performance that they now have two units insulated with the silicone system, and plan to have the remaining ones insulated this way as they fail. *No. 288*



Trolleys Don't Stop Here

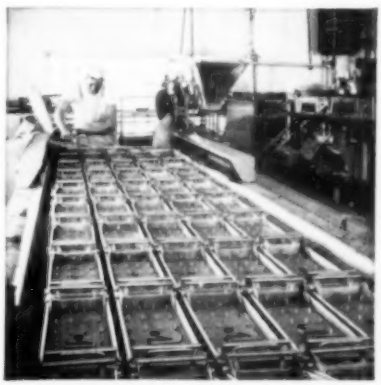
The lubricants you use have an important bearing on production efficiency and costs. Here's proof.

A leading manufacturer and finisher of auto seat springs is Stubnitz Greene Corp., of Adrian, Michigan. Back in 1947, the organic lubricant they were using on oven conveyor trolleys kept failing, even when applied continuously. As a result, shutdowns and work stoppages were frequent, and several large bearings were ruined.

Then, Stubnitz Greene engineers heard of a new silicone lubricant—known as Dow Corning 41 Grease—and gave it a whirl.

Despite the fact that oven temperatures range around 475 F, and each of the 1000 bearings is exposed on a 20-minutes-in, 20-minutes-out schedule, Dow Corning 41 Grease worked fine—needed to be applied only once a week! The seven 4 ft. turn wheels within the oven also ran more smoothly with 41 Grease.

Result: Stubnitz Greene switched to 41 Grease exclusively, and hasn't had a bearing failure shutdown in the more than 10 years since. In addition, they've saved $67 per week in lubricant costs . . . the difference between $95 a week for organic lubricants and the $28 a week for 41 Grease! *No. 289*



OUNCE OF PREVENTION

The best way to defeat foam is to prevent it before it ever gets started. And you can do that with just a touch of silicone defoamer. *(Cont. Pg. 2)*

FOR DATA RELATING TO THESE ARTICLES, CIRCLE REFERENCE NUMBER IN COUPON ON NEXT PAGE

MORE

VALVE SEALANT STAYS PUT

Any plant can have valve sealing and lubricating problems . . . and most do. Often, they won't be solved completely until a nonreactive sealing compound is used—one that resists oxidation, chemicals, oils, heat and other common causes of valve leakage.

A large Southwest chemical plant, for instance, must seal hundreds of angle and safety relief valves and special measuring gauge rods on railroad tank cars. The cars carry a variety of chemicals: ethylene and propylene oxides, ethyl, methyl and vinyl chlorides, butylene and butadiene.

To eliminate valve sticking, and possible contamination of these chemicals, this company specifies Dow Corning Valve Seal, a silicone compound. Semi-inorganic silicones are practically inert, withstand many chemicals, are noncorrosive and noncontaminating. In addition, Dow Corning Valve Seal resists oxidation, heat and moisture. It has proved to be the answer to this company's tank car problem, and maintenance men find they need to apply it only about once a month. They also use it on hold-down bolts to prevent seizing and galvanic corrosion.

Better investigate this silicone valve lube . . . it might be just what you need. *No. 290*

DEFOAMER *(Continued)*

Thayer Dairy in Clare, Michigan, makes ice cream sticks, popsicles and Fudgsicles. When the freezing molds for these treats travel through a calcium chloride brine tank, foam becomes a troublemaker. What to do? Thayer has the answer: Dow Corning Antifoam AF Emulsion. Six ounces prevents foam in the 640 gallons of brine being agitated by means of air—that's less than one ounce per hundred gallons!

This small amount prevents foam and loss of brine, eliminates a lot of cleaning time, and speeds production. Whatever your foam problem, whether in oil, water, or other systems, there's a Dow Corning silicone defoamer to help solve it. *No. 291*

new literature and technical data on silicones

A GUIDE TO WHERE the best silicone electrical insulating materials are available. For your nearest source of insulating components that enable you to increase the life and reliability of electrical equipment and provide a 25 to 50 percent service factor, contact one of the many distributors of Dow Corning silicone products listed in a 4-page data sheet. These distributors also supply silicone adhesives, caulking or potting pastes, dielectric compounds, greases, release agents, and water repellents . . . *No. 292*

THE HUNT IS ON — but it needn't be. If you're in search of an answer to your production and maintenance problems, the 1959 Guide to Dow Corning Silicones may provide you with a lead. Well indexed pages describe and illustrate the versatility of silicone products that are used in virtually every industry . . . . . *No. 293*

A LITTLE SAVES A LOT — Processing, shipping, and storage space can be fully utilized when a silicone defoamer is used to banish asphalt's tendency to foam. Just a teaspoonful of Dow Corning defoamer can control a storage tank-full of asphalt and in no way decrease its usefulness. Find out about silicone asphalt defoamers by writing for . . . . . *No. 294*

MASONRY PAINTS PROTECT MORE PERMANENTLY when applied to surfaces primed with Dow Corning 770 Water Repellent. Test results tabulated in a recently revised data sheet demonstrate the improved durability of masonry paints when brick and concrete constructions are primed with this water repellent silicone product. Maintenance of painted masonry is reduced even in severe climates. Consider the comparative evaluations by writing for . . . . *No. 295*

A CODE IS YOUR KEY to where you can get the Silastic material you want. A recently revised list of Silastic fabricators is letter-coded to let you know at a glance which rubber companies calender, dispersion coat, extrude, mold, sponge, or make ducting, hose, o-rings, rollers, or specialty parts from Silastic. If you consider ALL the properties of a silicone rubber, you'll specify Silastic from one of these fabricators. *No. 296*

REMOVE THE GUESSWORK from selecting the silicone to solve your release problems. Dow Corning silicone release agents for plastics are easy to apply, profitable to use, and available in several forms to meet any plastics parting problem. A listed summary of silicone release agents gives their characteristics and application methods, and suggests the respective plastics for which each is best suited. . . . . *No. 297*

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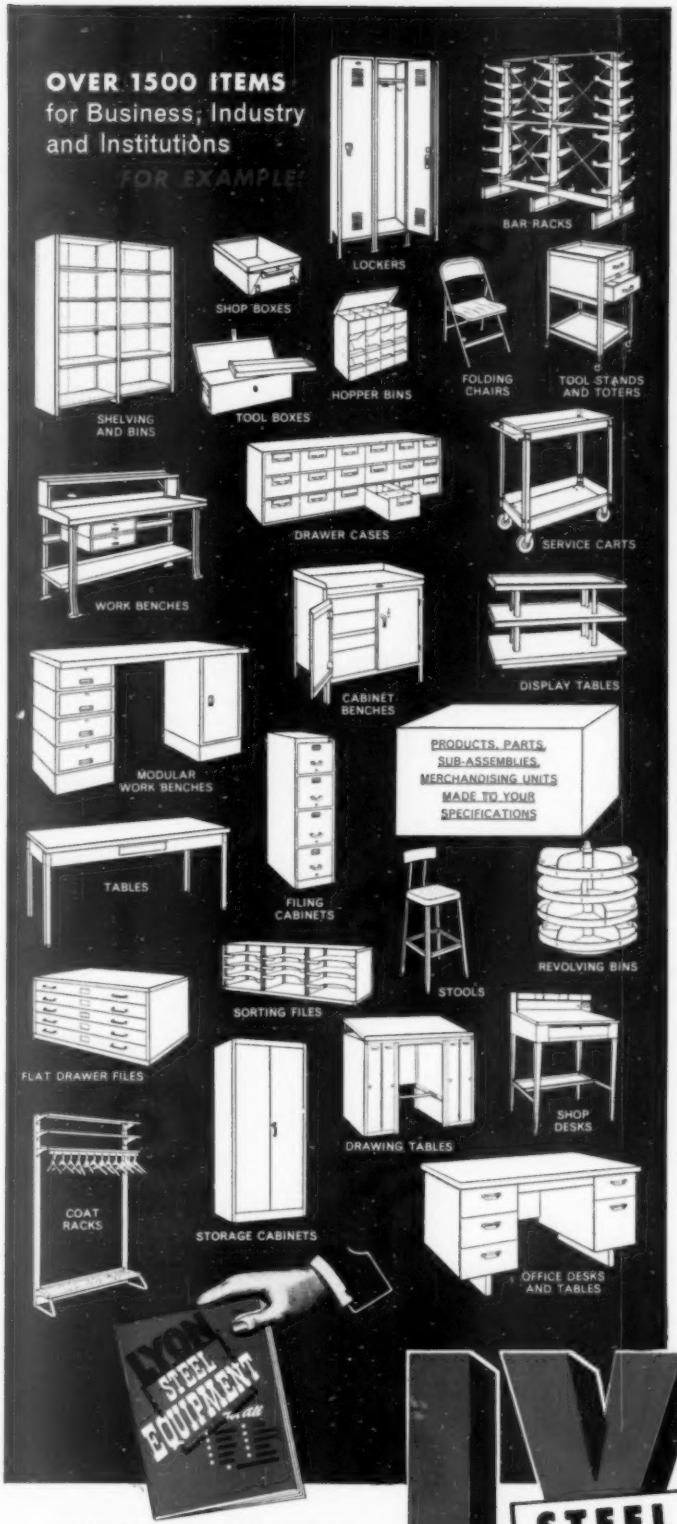

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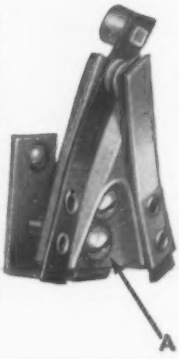

Sealed Capsule Blower Motors—resilient base

Horsepower	⅓	⅓	½	½	¾
R. P. M.	3600	1800	3600	1800	3600
Frame Size	56-1	56-1	56-1	56-2	56-2
Horsepower	¾	1	1	1½	2
R. P. M.	1800	3600	1800	3600	3600
Frame Size	56-3	56-3	56-5	56-5	56-6

Sealed Capsule General-Purpose Motors—rigid base

Horsepower	⅓	⅓	½	⅓
R. P. M.	3600	1800	3600	1800
Frame Size	56-1	56-1	56-1	56-2
Horsepower	¾	¾	1	
R. P. M.	3600	1800	3600	
Frame Size	56-2	56-3	56-3	

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New faces in tool engineering . . .

Changes all through the plant will hit you when you, too, make the switch to numerically controlled machines. That's why you'll want to learn . . .

What Three Plants

COST SAVINGS as high as 1000%, dramatic production increases, tooling costs and lead times slashed. These are the results of numerically controlled machine tools in use by the aircraft industry (photos above). The results prove that conventional machine tools will go the way of hand wringers on washing machines and standard gear shifts on autos. It's just a question of time until all your machine operations are programed in advance, put on punched cards or tape, and "played" into the machine tool.

How soon? Depends on your operation—automotive, ordnance, precision machinery, even job shops and tool and die shops. If your products are complex, with lots of critical dimensions, the change may be overdue. Greatest savings are realized on parts that sculpture metal. If your products are easy to make on standard machine tools, it may be years before the economics of the new machining method come home to you. A numerically controlled punch press, for example, offers plenty of potential in terms of speed and accuracy, but affords little opportunity for tooling savings.

By HENRY P. KILROY
Staff Engineer
Concord Controls, Inc., Boston.

One thing is sure. When the new machines hit your plant, you'll have problems. They demand new skills, new attitudes, new problem-solving efforts. You can ease the strain by preparing.

Convair Division of General Dynamics Corporation (San Diego), Boeing Airplane Company's Wichita (Kan.) Division, and Rohr Aircraft (Chula Vista, Calif.) are plants with tape-controlled machine experience. All have felt the heavy impact of tape-controlled tools in every plant department. You'll get plenty of helpful hints from the following rundown of their experiences—and from their advice to plant operating managers who have not yet installed numerically controlled tools:

PROGRAMING YOUR WORK

It takes two kinds of knowledge to program a complex machining job (such as metal sculpture) on a numerically controlled machine. One kind to select applications that will give a maximum return from numerically controlled tools. Another kind to convert the engineering drawing into mathematical language for use by the control mechanism. This presents a problem in organization. Should responsibility for programing be located in manufacturing engineering or in a central computer section?

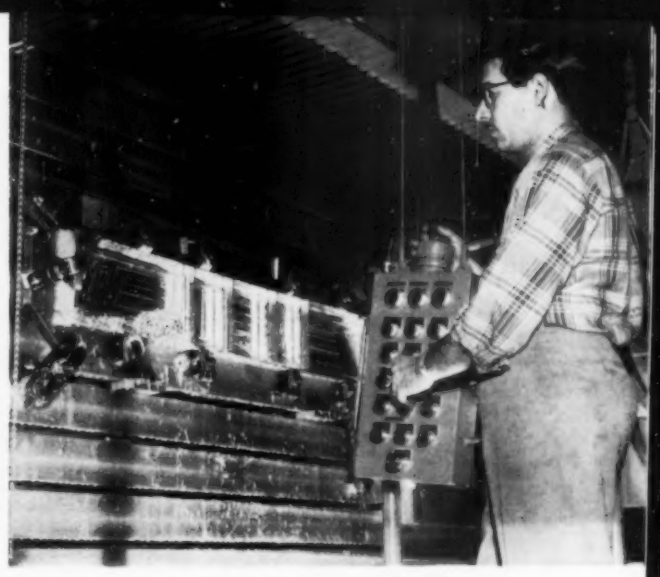
Cooperative programing—Boeing chose the central computer section, and with considerable success. The finance department does final programing. That's where the computer section has historically been located. For programing of numerically controlled machine applications, however, a diversified group operates. Its personnel are representatives of tool design, tool and production planning, and the financial department's electronic data processing (EDP) group.

The production men in the group are responsible for determining applications and defining the manufacturing problem in mathematical language. Then the EDP men take over and write the mathematical program for the 705 computer.

The group's working quarters are in the data processing area. But each man remains an employee of his particular parent organization. For example, higher management in tool engineering directly supervises the tool engineer.

Under this cooperative plan it is not necessary to have several groups of computer mathematicians in the plant operating independently. The EDP group handles all mathematical calculations. Parts programers from

new programing skills . . .



new needs out in the plant.

Have Learned About Tape Control

manufacturing engineering learn the words peculiar to computer language. With these, they write a program manuscript. They need not know higher mathematics.

The EDP group is responsible for writing computer programs to convert information on the program manuscript into machine-controlled tape. This process includes keypunching IBM cards used to put information into the 705 computer. Computed information is transferred to output cards. On some machines, such as skin mills, output card is converted to punched paper tape through a specially built card-to-tape converter. This punched tape is the input information used by the Concord Control Director (Boeing-Wichita has the first production model). In the Control Director, the information is recorded on magnetic tape. The machine is actually controlled by the magnetic tape.

Other machines use different control systems. Some simple machines are activated directly by the output cards. For others, the information on the output cards is converted to punched tape, and the punched tape activates the machine.

The best programing organization for you will depend on your plant's situation. The volume of work to be programed, the availability of mathematical skills in manufacturing engineering, and the availability of skills in a central computer group (if you have one) will be important elements in your decision.

DESIGNING TOOLS

Numerically controlled machines present new problems in tool, fixture, and cutter design. Generally, tool holders must be simpler, with better access to the work, because the machines do more operations in a single set-up. Convair has solved this problem by using fewer strap clamps, even to bolting the part on the table with Allen bolts. It also uses aluminum and vacuum clamping more extensively. Boeing agrees with the need for good access, but says the approach varies with every part.

As far as cutter design is concerned, the best approach depends on whom you talk to. M. C. Copold, coordinator of numerical control at Convair-San Diego, says this:

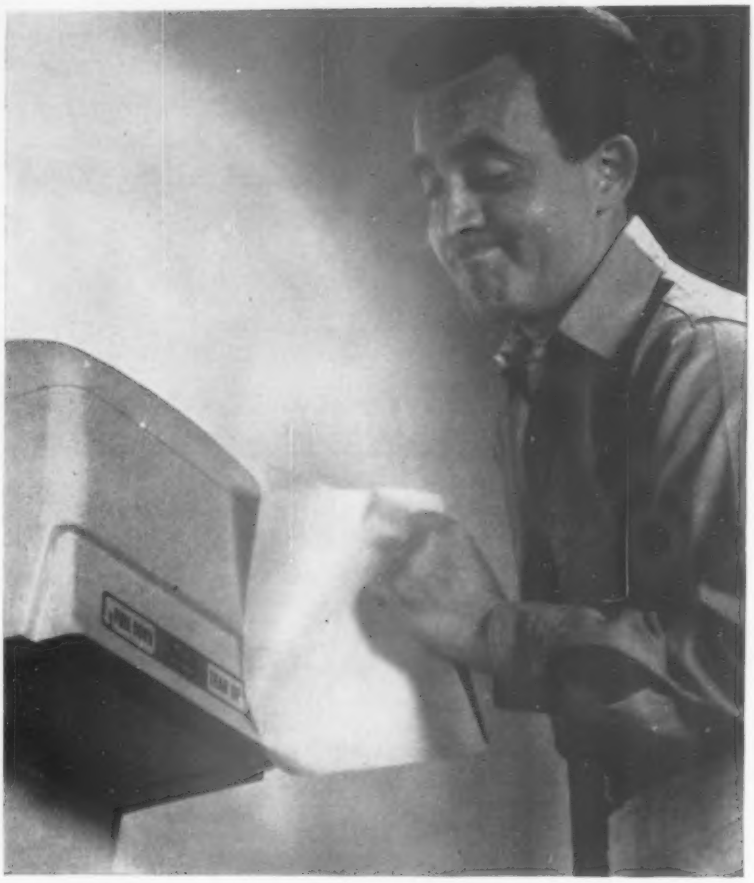
"We find the old shop ratio of cutters per machine no longer holds. We now need more, because the machines do more work. We have adopted new methods of grinding to remove less stock and have designed new cutters, with carbide inserts, to prevent destroying the locating point when we grind and to reduce the number of new tools we need. We also are using smaller primary clearances and almost no secondary clearances."

Rohr Aircraft, Convair's neighbor in nearby Chula Vista, takes a different tack. Rohr uses standard cutters but color-codes some on receipt so they'll be used only for numerically controlled profilers. J. O. Howard, Rohr's machine tool foreman, puts it this way:

"We program parts to the mean diameter of the cutter. As each cutter is ground and re-ground, we work it and report our over-all situation to the programing department. Thus they always have an up-to-date record of the number of cutters on hand, with dimensions. We then base parts programing on the dimensions of an available cutter, making sure, of course, to use the right cutter with the right tape. In this way, we feel we get maximum production from our cutters, without paying cost of special tools. We will go to specials if later studies warrant them."

Boeing has been carrying on tool research now for some six months. Tool department is assigned a numerically controlled machine tool for four hours a week to check out new designs. In between time, of course, it keeps records of tool life.

Turn the page



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3 PLANTS ON TAPE CONTROL
Begins on page 140

Boeing designers feel they must live with what they have and program the job to the cutter until they develop complete data. So far, they have reduced rake angles, specified different types of carbides.

Training scheduled—All users point out the need for tool designers to know feed rates, depths of cut, cutter path, and sequence if they are to do an intelligent job on tool and cutter design. Without exception, at these three companies, selected personnel from the tool and production planning departments have had intensive training courses to acquaint them with the numerical control language and machines.

Toolmaking is simplified, too. Plants with several tape-controlled profilers are finding that these machines can effectively produce templates for other machines. Boeing has one machine working full time on such production—and it's loaded for six months. It has another profiler that works about half-time on tools, half on production jobs.

Because of frequent contact with all types of new equipment and methods, industrial engineers usually take numerically controlled machine tools in their stride. But methods engineers need an intimate knowledge of the equipment and the programing procedures. Here's why: The first program is never as good as it should be. There's a learning curve, short but sharp, involved in programing any part. Improvement in cutter path, machining speeds and feeds, number of reels of tape, and even operating sequence can reduce production time by 50% or more. On one skin mill, in one instance, production time was cut from 700 to 500 to 300 and finally to 200 hours by restudying the machining cycle.

With proper training engineers can keep the equipment loaded and operating at maximum efficiency.

MANUFACTURING PARTS

With numerically controlled machines tool operators have a new concept on their hands. They must learn how the machines operate. They must change their thinking on how long it takes to produce a part. They must learn to depend more on

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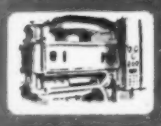

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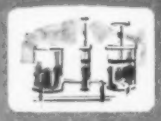

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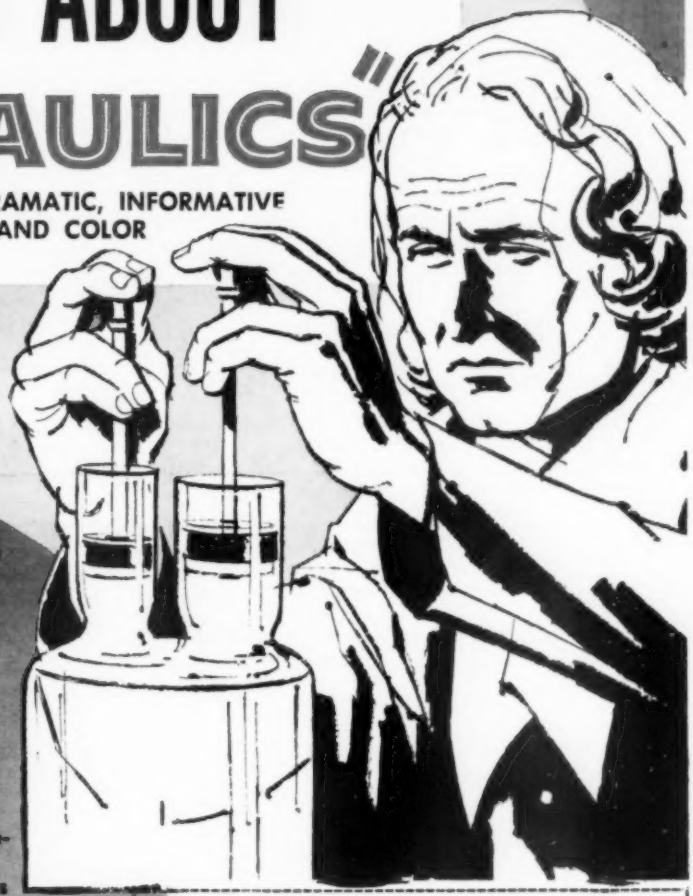

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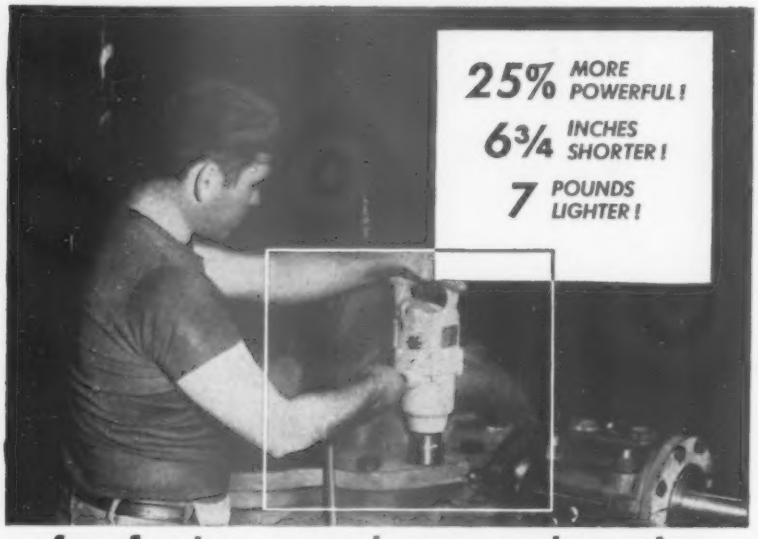

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3 PLANTS ON TAPE CONTROL
Begins on page 140

maintenance, not only when the machine goes down but when there's a production error. And they must learn to handle tapes, take time to see the right tape is on the machine.

Production managers must institute training for operators, foremen, and higher management. They must set up schedules that allow time for the inspection department to check first parts before second parts are produced. And they must be prepared for the unexpected. Take two examples:

- One shop complained that cutters were not holding up on numerically controlled profilers. They were lasting only 50 minutes instead of the eight hours that they stood up on tracer controlled milling machines. A check revealed that the volume of metal being removed in 50 minutes was the same as that formerly removed in eight hours. Production needed a bigger stock of cutters.
- It took three hours to load a part. No one gave the problem much attention when the machining time was 30 hours. But when the company cut machining time to six hours on numerically controlled skin mills, all eyes focused on handling. Company engineers devised new methods for loading. Numerically controlled machine tools are a radical new concept, and the degree to which they reduce cost and production time will depend to a large extent on how the shop accepts them. So there must be planned introductions.

CONTROLLING QUALITY

New problems for quality control are in the making when a plant takes delivery of a numerically controlled machine tool. For one thing, there's the problem of volume. Production on numerically controlled tools may be many times greater than production with conventional methods. Result is either a much increased inspection force, or changed methods.

Boeing's inspection department now thoroughly checks only the first part off its numerically controlled machines.

Scheduling of inspection personnel time is a new problem. With lots of money and time tied up in numeri-

Turn to page 148

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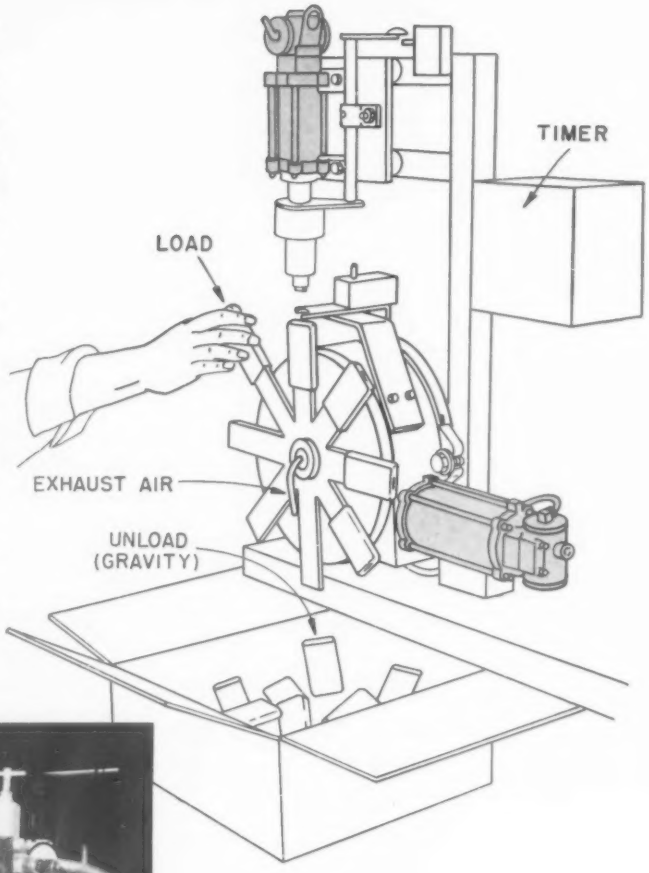
It's another example how versatile Bellows "Controlled-Air-Power" Devices can be used to "spot-automate" operations in almost any industry. This "SPOT-A-MATION IDEA" is based on a setup used by Frank Steere Enterprises to cut a slot in a plastic key case. But the basic idea can be adapted to perform a host of operations in wood, leather, light metals, or plastics.

It's a simple, inexpensive device. A Bellows Rotary Feed Table, mounted vertically, feeds the part to the tool attached to the piston rod of the Bellows Air Motor. The two are electrically interlocked. Bellows Rotary Feed Tables can be provided to index almost any number of positions. The unit can be equipped with a "timed dwell"; additional work stations can be set up to perform other operations on the same part; automatic feeding or ejecting devices could be installed.

Whatever you make, however you make it, Bellows "Controlled-Air-Power" Devices can help you make it at lower cost.



In this application a heated Slotting Tool is used, hence the Bellows BT-1 Timer to control the length of time the tool is in contact with the plastic part. The exhaust air from the Rotary Feed Table is used to give an assist in unloading the part.

THIS SPOT-A-MATION IDEA FILE IS YOURS ON REQUEST

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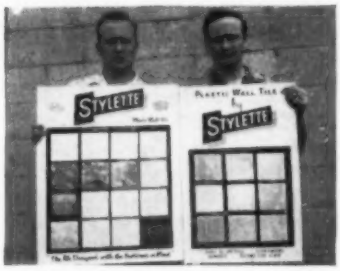

The Goetz Twins, owners of Stylette Plastics went into the plastics business in Pittsburgh in 1952 on the recommendation of their professor at Duquesne University. They started with $1,500 and bought a nine ounce injection molding machine to make plastic tile.

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Begins on page 140

cally controlled tools, it pays to have an inspector handy the minute a first part comes off a new set-up. The problem for the inspection manager is to keep efficiency and still check new set-ups quickly.

Inspectors also have new roles to play. One is to check out a machine before it's run, even for a first part. Idea is to avoid first-piece scraps where possible. Parts produced on numerically controlled profilers often are expensive.

And there are new problems. For example, it's possible to engineer a complicated part without a drawing. The shape must eventually be interpreted as a series of numbers, so it makes sense to engineer the part in those terms in the first place. Convair used this method to design and build a wing model for an advanced design aircraft. It made the wing section in two weeks instead of a conventional six months. But inspection wound up with this problem: With no print, how do you check a part?

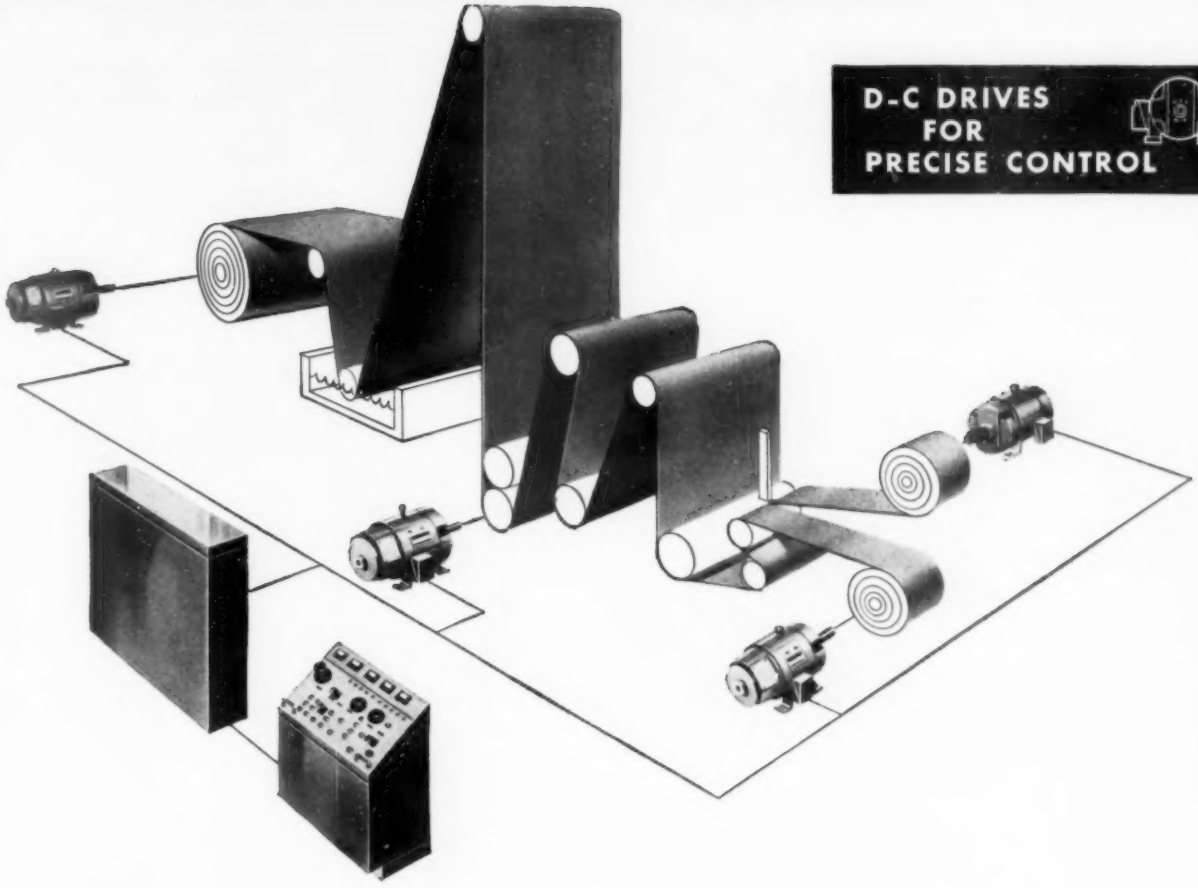
Then there's the old quality control bugaboo: tighter tolerances and higher surface finishes. They're entirely possible with numerically controlled tools, and engineers learn to specify them as they build knowledge of the tools.

ESTIMATING COST

There are three problems here. First you must persuade estimators that results are as good as they are. Second you have to acquaint them with new types of charges, such as operation of type preparation equipment, and programing. Finally, you must provide them with experience data as rapidly as possible so they can build new safety factors for cost estimation and contract analysis.

When you first get numerically controlled machines, you may work on either conventional machines or the new equipment. So there must be constant liaison to determine which parts are suitable for production on which machines, and the time-cost charges for each. As experience builds up and you purchase more numerically controlled machine tools, the task will become easier.

Turn the page



Problem: How to control sheet or web tensions for faster machine operation, better quality

Tension inaccuracies during high speed production can result in torn sheet, costly production snarls, poor product quality. To control sheet or web tensions accurately, speeds of machines must be closely synchronized. Equipment must be brought up to top speed gradually—smoothly—without loss of tension. Often a dozen motors must respond as one—instantly. **Direct-current drives can best meet this need.**

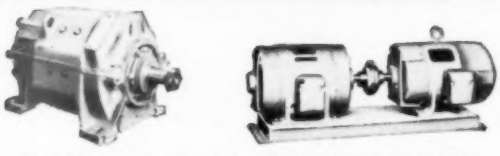
In continuous processing—wherever accurate control is needed—direct-current adjustable-speed drives perform with instantaneous tension adjustment—smoothly, automatically. The result: faster machine operation, better quality, lower production cost.

This is only one example of d-c's modern capabilities. Throughout industry there is a growing trend to more direct-current powered equipment. The reasons for this trend are explained in a new General Electric booklet called "WHY D-C?" For your free copy, write *Department 829-1, General Electric Co., Schenectady 5, New York.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

SELECT FROM G.E.'S COMPLETE LINE OF D-C DRIVES



MOTORS AND GENERATORS

POWER UNITS AND CONTROLS

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THE ALVEY-FERGUSON CO., 132 Disney St., CINCINNATI 9, OHIO

Please send me FREE illustrated, descriptive brochures on A-F *Engineered:*

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3 PLANTS ON TAPE CONTROL

Begins on page 140

PLOTTING MAINTENANCE

The area that frightens most nonusers of numerically controlled machines—and it must be admitted, some users, too—is the level of maintenance required on numerically controlled machine tools and tape preparation equipment.

Numerically controlled machines are more complex than standard models, and equipment for magnetic tape preparation is even more intricate. With several hundred vacuum tubes and several thousand diodes, how could it be otherwise?

High-level shop personnel can maintain it, though, if given a fair degree of training, if provided with adequate maintenance "tell-tales," and if not expected to find the trouble as quickly as they'd find a sticky valve in a hydraulic circuit.

Locating trouble takes time. Use of sample tapes and circuit waveforms—or both—may be necessary. Engineering assistance may be needed at times, especially until the equipment is "de-bugged" and in operation. But the aircraft industry has proved that the problems are not insurmountable.

GETTING YOURSELF SET

All this sounds as though numerically controlled equipment will completely dislocate a production shop. Nothing of the sort. But there's no sense in pretending that it won't necessitate training or that it won't present new and unfamiliar problems to personnel.

Nor is there any point in obscuring the cost of numerically controlled machine tools. Some cost a great deal. A large profiler together with its tape preparation equipment is well into the six-figure bracket. That's about the extreme. But it would make any manager gnaw on his tie—unless he also considers the savings. There's no doubt the equipment can be made to pay for itself within a short period. The fabricator who tries to compete, using 10-year-old equipment, will simply go out of business.

Now is the time to tackle those problems and train personnel. Waiting until later will only compound the difficulties. **END**

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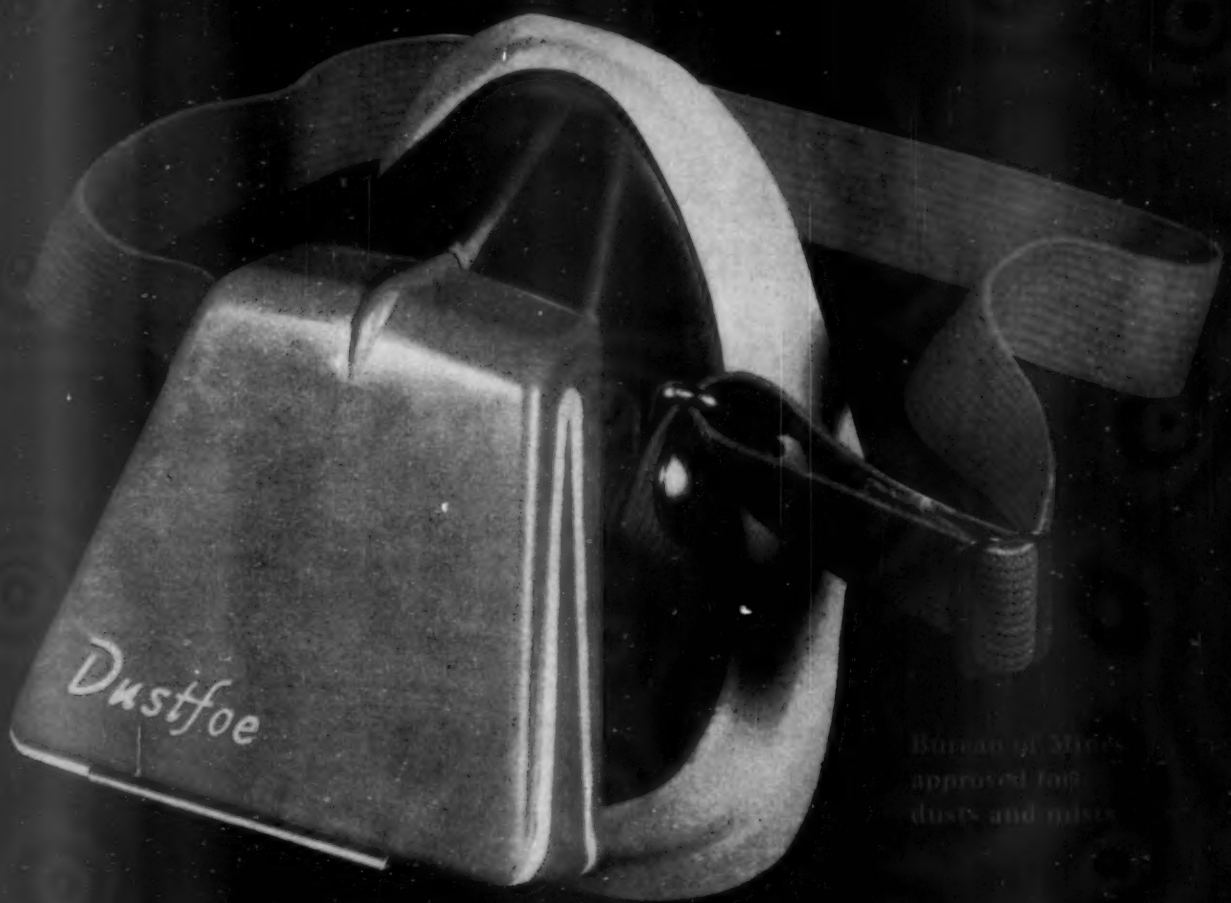
ONE RESPIRATOR STANDS OUT



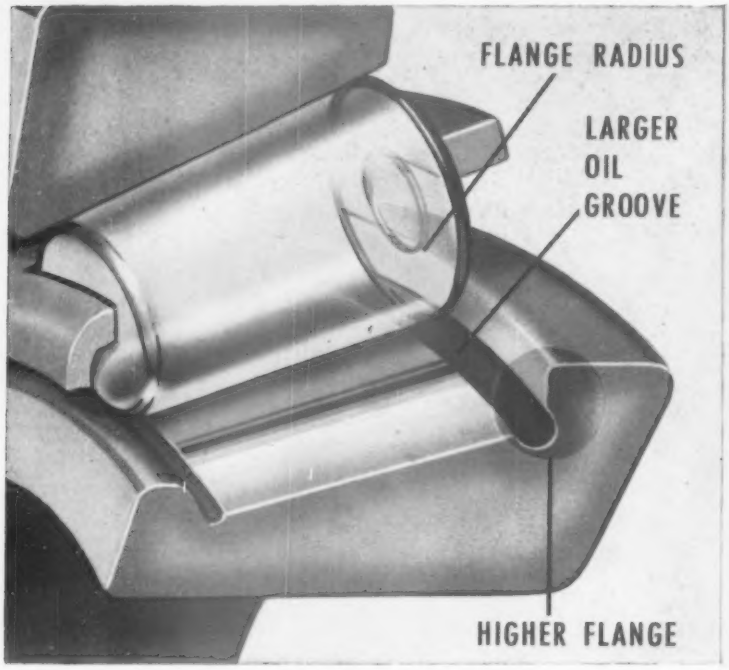
Bureau of Mines approved for dusts and mists

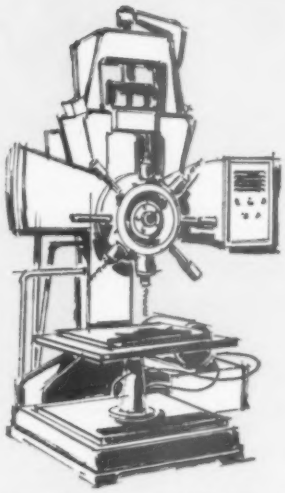
Every day—in many ways—MSA products safeguard millions of lives

MSA

Mine Safety Appliances Company • Pittsburgh 8, Pennsylvania

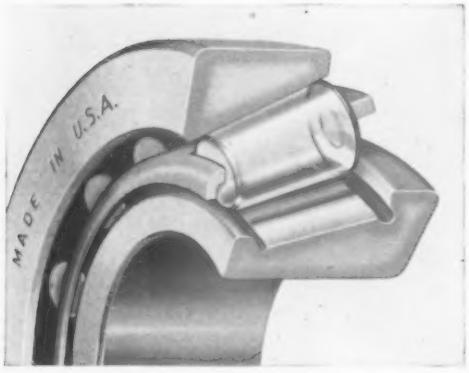
Better products, *faster,* from your Bearing Specialist:





FINE-TOLERANCE MACHINING calls for Bower Tapered Roller Bearings to hold pre-load better, stay in adjustment longer.

Bower designs 3 "long-life" refinements into one small section of tapered roller bearings



Bower Tapered Roller Bearings are *Spher-O-Honed*: 1. Roller heads are spherically contour-ground, need no "run-in"; 2. Oil groove is bigger for positive roller-head lubrication; 3. Honing superfinishes inner and outer races for longer life.

Extra-high flange, larger oil groove, shoulder radius—each helps reduce friction, provide long, maintenance-free service

Bower's skill at the design board pays a bonus in service life when tapered roller bearings go to work in your machines. Take for example these *three* design refinements in *one* small area:

1. Higher flange gives rollers a large, "two-zone" contact area, cuts unit pressure on each roller; it also improves roller alignment, thereby reducing wear and resulting "end-play". **2. Larger oil groove** insures positive roller-head lubrication; increases efficiency and decreases wear. **3. Flange radius** helps the oil groove maintain an unbroken film of lubricant on the roller heads. All three add up to longer bearing life, lower cost to you.

Whether you need tapered or straight roller bearings, check *first* with the Bearing Specialist who handles the Bower line. He stocks both types; gives fast delivery on each. Call today!

BOWER ROLLER BEARINGS

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

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Depreciation Reform—

Why Industry Needs A Modern Tax Policy

A shockingly large proportion of our industrial plant and equipment is obsolete. As indicated by an earlier editorial in this series, over $95 billion would have to be spent —and spent soon—to bring our industrial facilities up to the best modern standards. Yet plans for 1959 call for little more than $30 billion of actual spending—barely enough to make a start on this backlog of modernization.

At the heart of the problem of obsolescence is a federal tax policy that discourages business from replacing inefficient facilities. It is the purpose of this editorial to spell out a tax reform Congress can make this year—with little cost in terms of tax revenue—that would go a long way toward removing the barrier to modernization of plant and equipment. This reform is a more realistic system of tax deductions for depreciation and obsolescence of productive facilities.

A Barrier to Modernization

Industry abounds with examples of old and obsolete facilities—despite large expenditures made in the past few years. Two-thirds of our metalworking equipment is over ten years old. Over half the capacity of our chemical process industries was installed before December 1950. Only a minor fraction of our railroad freight moves in new freight cars or the new push-button freight yards.

The tax law bears a large part of the responsibility for this lag in modernization because of its important influence on business investment in plant and equipment. For many years the tax law has permitted as a deduction from income "a reasonable allowance" for wear and tear and obsolescence of productive facilities. These annual deductions affect business investment in several ways.

- They are the way a company recovers its investment in plant and equipment.
- They determine in large measure, the amounts of money that are spent each year to replace and modernize facilities.
- Furthermore, the schedule for depreciation often determines **when** a specific machine or building is actually replaced.

The law requires that depreciation deductions be spread over the "useful life" of a building or machine. But the periods of useful life for tax purposes today still depend heavily upon tables drawn up by the Treasury almost 20 years ago. These tables reflect the replacement practices of depression years. Also, they were compiled at a time when the pace of technological progress in industry was much slower than it is now. **For nearly all types of equipment the indicated period of useful life is longer —sometimes much longer—than most experts consider realistic at today's rate of technological advance.**

The result of these outmoded depreciation schedules is that the recovery of investment is dragged out, and the replacement of obsolete equipment is delayed.

In The Right Direction

Congress should establish, by law, the right to use shorter depreciation periods on productive equipment. It should do so in a way that would free industry from obsolete concepts of the rate of technological change and would provide incentives to install new equipment and produce new products.

The tax reform act of 1954 made some progress in this direction—but not enough. It introduced new methods for calculating depreciation —the declining balance and the sum-of-the-years' digits—which enable a business to recover most of the investment in a new facility in the early years of its useful life. However, these new methods do not accomplish their desired purpose when the supposed "useful life" is still an unrealistically long period of years.

Industry is by no means free from blame for the failure to bring depreciation policy into line with the needs of a modern, growing economy. According to Joel Barlow, president of the Tax Institute, "management has largely ignored the Commissioner's invitation . . . to come into the Internal Revenue Service office and make a case for shorter depreciable lives by establishing technological obsolescence."

The failure of many companies to see their own interest in more realistic depreciation not only holds them back from modernizing their own facilities but also lends support to the Treasury in its continued adherence to an outdated policy.

A Suggestion For Reform

An excellent model for reform of the depreciation policy in our tax law is the system used successfully in Canada for a decade. In Canada, all productive equipment may be depreciated at relatively fast rates assigned to each of 14 broad categories. The Canadian system permits depreciation up to twice as fast as the antiquated tables of useful lives now followed in the U. S. It also gives the individual business far greater flexibility in determining depreciation schedules that fit its own needs and experience.

For example, in the category or "bracket" covering general machinery a taxpayer in Canada may depreciate up to 20% of the machine's value annually, on a declining balance basis. In the U. S. the fastest rate at which many types of machinery can be depreciated is only 10%. In other categories, from tools and dies to buildings and pipelines, the Canadian system also allows faster depreciation and provides greater incentive to invest in new facilities.

The cost of this reform in terms of lower tax revenue would be small—probably less than $500 million in the first year. And even this would merely be postponed, not permanently lost. Indeed, there is a very good prospect that tax revenue would not suffer at all. The increase in spending for new plant and equipment resulting from this tax reform would mean an increase in wages and profits—and therefore in taxes—in industries that produce machinery and other capital goods.

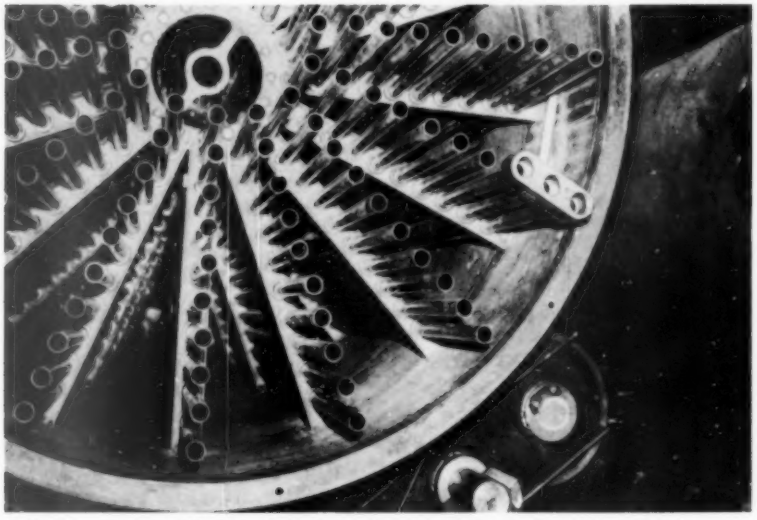
A realistic tax policy on depreciation would provide a badly needed incentive for industry to replace obsolete and inefficient facilities with up-to-date plants and equipment. It would step up our rate of technical advance and economic progress. And it would put U. S. industry in better shape to meet the growing competition from other countries that have grasped the advantages of fully modern technology.

This message was prepared by the McGraw-Hill Department of Economics as part of our company-wide effort to report on opportunities for modernization in industry. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or part of the text.

Donald C. McGraw
PRESIDENT
McGRAW-HILL PUBLISHING COMPANY, INC.

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company



Lafueille crystallizers, like the one pictured above in a sugar refinery, use cold drawn 4-D Wrought Iron tubing. 4-D Wrought Iron heat exchanger and condenser tubing is virtually unaffected by refrigerating gases such as ammonia, carbon dioxide and Freon. Highly resistant to both corrosion and abrasion, 4-D lasts longer than many higher priced ferrous and non-ferrous metals in salt water, heat transfer brines, and industrial cooling waters.

Industrial Plants Report a Tubing Material More Durable Than Expensive Alloys

Industrial maintenance records indicate cold drawn Wrought Iron tubing displays more durability than expensive alloys and non-ferrous materials. Invariably, 4-D gives longer tubing service life than carbon steel.

Here are two reports on typical industrial applications:

- A double-tube ammonia condenser in an ice plant had steel tubes. The cooling water used in this condenser contains 76 ppm of sodium chloride. The steel tubes failed after 2 years and were replaced by Wrought Iron tubes which are still in excellent condition after 18 years.
- Vaporizers for butane and propane gas production handle petroleum under pressure at ambient temperatures (10°F. min.). Petroleum is vaporized by passing steam at 10 psi and 265°F. through tubes inserted in the jacket. The unit operates continuously. In this application mild steel tubes were destroyed in 3 to 6 months and stainless steel tubes in 6 to 9 months. Wrought Iron tubes are serviceable for at least *two* years.

We have a technical report which covers briefly, but informatively, 15 similar heat transfer equipment installations. Actual names and places of the installations appear in this report. Comparative cost-per-foot-per-year figures have been calculated for Wrought Iron and steel. A copy of this convincing study will be sent to you upon request.

Stack Service Life: Ripe Old Age or Early Demise?

The material you select for stack applications can make the difference of a lifetime. 4-D Wrought Iron resists acidic flue gas corrosion much more successfully than ordinary steel. Moreover, the protection of a 4-D Wrought Iron stack costs much less than a masonry stack.

4-D Wrought Iron in stack service gives no evidence of the rapid deterioration so characteristic of conventional materials. Although costing somewhat more than steel, 4-D often lasts more than twice as long. This saves the cost of at least one re-fabrication and re-installation, as well as accompanying interruptions and downtime. When building new stacks or replacing old ones, consider the long service life of 4-D Wrought Iron.

4-D Wrought Iron plate lengthens stack life, reduces maintenance costs at new Owens-Illinois Glass Company plant in Atlanta, Ga.

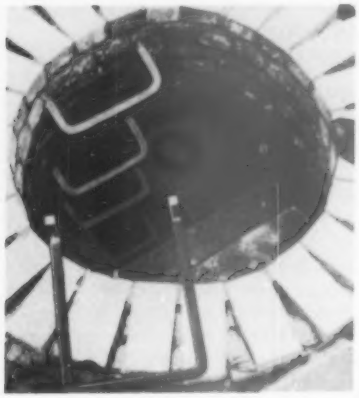
In Sulfuric Acid PVC Bests Stainless at 1/5 the Cost

Stainless steel pipe often fails where Byers Polyvinyl Chloride Pipe doesn't. Take sulfuric acid applications. Here, Byers PVC Pipe not only out-performs stainless in terms of corrosion-resistance, but costs less on an installed cost basis: only one-fifth the cost of stainless.

In a wide range of other corrosive applications where metal pipe is either unsatisfactory or quite costly, Byers PVC provides constant, uninterrupted service. In acid fume vent piping, acid reactor blowoff lines, drain and sewer lines, and process lines handling acids, alkalies, oxidizing agents, alcohols, brines, plating solutions, slurries and the like. Where product purity is important, Byers PVC Pipe is especially suitable. It won't contaminate. We have a raft of performance data on our PVC. Write us about your specific application or problem.

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company



Wrought Iron rungs are shown here set in masonry in the 85-foot Main Avenue water tunnel shaft in Cleveland, after serving 55 years. Because of uneven spacing, the old rungs were burnt off and replaced with new ones of 4-D Wrought Iron.

How Safe Are Your Manhole Ladder Steps?

To provide workmen with safe, secure footing on manhole ladders, it is imperative that the steps be corrosion-resistant. Damp, humid atmospheres found in tunnels are death to ladder steps made of ordinary metals. Ordinary metals don't stand the test of time and wear as well—or as economically—as 4-D Wrought Iron. 4-D is durable. Safe. Practical. Needs no protective coatings. A firmly anchored protective scale, developed by the material itself, acts as a shield against further corrosive attack. No other metal has this unique capability.

Many plants have developed a standard design for 4-D Wrought Iron ladder steps and stock them in quantities at the warehouse. Play it safe. Use 4-D Wrought Iron for fabricating your new ladder steps—or for replacing old ones.

U. L. Approval for 4-D Wrought Iron Conduit

Certification of 4-D Wrought Iron electrical conduit by Underwriters' Laboratories, Inc. offers plant people another new weapon for battling corrosion. The labeled conduit is especially suitable for highly corrosive plant applications where attack by aggressive elements causes excessive maintenance or replacement of ordinary conduit materials.

Wrought Iron has been used for over 50 years in corrosive electrical conduit installations not requiring U. L. certification. Now, with the U. L. label, 4-D Wrought Iron can be used for any conduit application. There's no internal flaking or clogging with this conduit. Its resistance to vibration and fatigue stress is excellent. Fabrication is a cinch. And it's sherardized and coated with MVC-1 vinyl. This guarantees easy fishing.

Through an agreement between A. M. Byers Company and National Electric Products Company, U. L.-labeled 4-D Wrought Iron conduit is marketed through National's 11 warehouses, 29 district offices and authorized distributors throughout the United States.

A Welding Tip Or Two

Each of 4-D Wrought Iron's two components—high purity iron base metal and glasslike iron silicate—has its own fusion temperature. The siliceous material melts first (2100°-2200°F.), several hundred degrees before the iron (2730° F.). But don't confuse the fluxing of the iron silicate with melting of the actual base metal. Just continue heating until the iron fuses. 4-D's self-fluxing action contributes to sound, durable welds.

WHAT IS "4-D"?

Wrought Iron is a two-component metal—high purity iron impregnated with non-rusting iron silicate fibers. *New 4-D* Wrought Iron was achieved by substantially increasing the deoxidation of the base metal, slightly increasing the phosphorous content, and using a more siliceous iron silicate. Result is increased corrosion resistance, improved mechanical and physical properties.

Literature Available

Literature described below is available on request. For information on specific applications, write Byers Engineering Service Department.

New four-color booklet, **4-D Wrought Iron: A New Dimension in Corrosion Control,** discusses in detail Byers' latest product development. Includes a test section which is graphically illustrated and shows comparative corrosion resistance of 4-D Wrought Iron, standard wrought iron and other ferrous metals.

New ten-page bulletin, **Cold Drawn Wrought Iron Heat Exchanger and Condenser Tubes,** cites actual installations in which the use of 4-D Wrought Iron and other metal tubing in the same equipment permits service life comparisons. Lists cost-per-foot-per-year for each material and the corrosive conditions present.

In the most technically complete PVC catalog yet prepared, we discuss our latest piping material—rigid unplasticized polyvinyl chloride pipe—its characteristics, applications, properties and installation practices. The **Byers PVC Pipe Catalog.**

For additional information on 4-D Wrought Iron, contact Byers Division Offices in the cities listed below.

The maintenance and operating items appearing in BYERS GUIDE were prepared by the Engineering Service Department of

A. M. BYERS COMPANY

Pittsburgh 22, Pennsylvania

ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA
PITTSBURGH • ST. LOUIS • SAN FRANCISCO • WASHINGTON, D. C.

4-D Wrought Iron is immediately available and may be obtained through established distributors of Wrought Iron Pipe. Plate, bar, and other flat rolled products may be ordered direct.

Corrosion costs you more than Wrought Iron

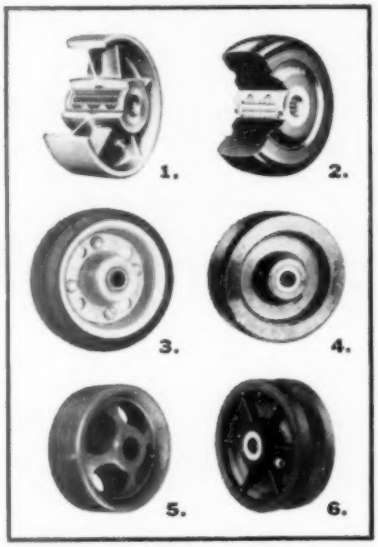
Printed in U.S.A.

MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Convenient caster refinements open up new ways to efficient, low-cost materials-handling

Modern Bassick casters have brakes, grooved wheels, shock absorption, sealed bearings, varied attachments, accessories



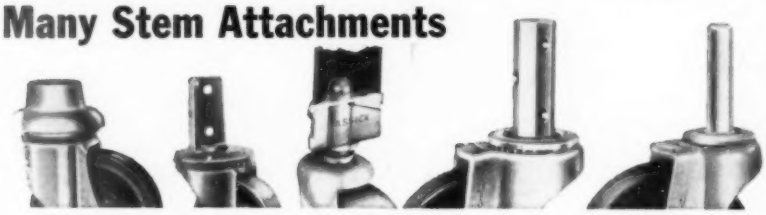
WHEELS FOR EVERY JOB, EVERY LOAD, EVERY FLOOR

Industrial caster wheels have come a long way from the original cast iron design. Today, you may choose (by the numbers at left):

1. Semi-steel wheels for heavy duty over rough floors. **2.** "Atlasite" hard composition wheels for increased floor protection. **3.** Demountable rubber tired wheels with bolted steel discs. **4.** Acid- and heat-resistant phenolic-mascerated canvas composition wheels. **5.** "Biron" powdered metal wheels with self-lubricating bearings. **6.** V-grooved wheels which operate both on inverted angle iron tracks and floors. And several others not shown.

Four types of wheel bearings are also available depending on the application: ball bearings, standard roller bearings, self lubricating bearings and tapered roller bearings.

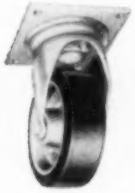
Many Stem Attachments

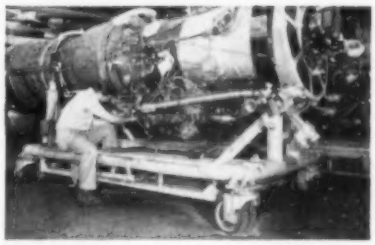


Stem casters are more suitable than plate casters for certain types of equipment. Bassick offers threaded pipe socket, iron angle plate, rivetless angle iron sockets, octagon and plain round stems (left to right, respectively) and others for all manner of equipment. Also available is a wide variety of plate casters.

Sealed bearings minimize maintenance end hazards of dripping grease

Medium heavy duty (Series "S99") and medium duty (Series "H99") Bassick casters with sealed swivel and wheel bearings reduce caster maintenance to a once-a-year lubrication. They are particularly useful in applications exposed to water or steam that might penetrate unsealed bearings. And being sealed, of course, they do not drip lubrication grease on the floor, an unsightly and hazardous condition.





Shock absorbing feature saves floors, loads, casters

Bassick's "Floating Hub" design, now available in light duty up to heaviest duty casters, absorbs shocks, snubs out vibration.

These unique casters are ideal for handling of liquids, breakable or delicate loads. But they are now finding use, too, in handling heavy loads in power pulled applications over extremely rough floors. Under conditions that kill ordinary casters, Bassick Floating Hub casters keep rolling. And they protect floors, too.

Wheel brakes, swivel locks extend range of equipment you can mobilize on casters

Scaffolds, machine tools, many types of equipment once considered stationary, now roll into position on casters, then stand steady when wheel brakes (left) are applied. Swivel locks (right) let you use equipment either on a straight-line movement job or for general mobility . . . or both.

Distributor can advise

Local industrial distributors who carry Bassick casters can show you the convenient caster refinements described here and often suggest ways you can use them in your handling operation. These men see a lot of plants, a lot of different handling operations. Their know-how, and that of Bassick engineers, is yours for the asking. 9.35

See our catalog in Sweet's or write for copy

Symbol of SW Excellence — Bassick — A DIVISION OF STEWART-WARNER CORPORATION

THE BASSICK COMPANY, Bridgeport 5, Conn. ***In Canada:*** **Belleville, Ont.**

For more facts Circle 531 on Reader Service Card

For more facts Circle 532 on Reader Service Card

FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor

(For more information, circle item numbers on Reader Service Card next to back cover)

Remember the jam every time you register at big trade shows? You can avoid this inconvenience at Material Handling Institute's Exposition (Cleveland, June 9 to 12) by registering in advance. For your hotel reservation, you're on your own. But if you circle No. 291 on Reader Service Card inside back cover, we'll see that you get a pre-registration blank. **(291)**

An abrasive so mild it almost isn't! That's what they're saying about a plastic tape (*Reeves Soundcraft*) that will remove the shine from almost any surface—and, like the chick in the ad, "hasn't scratched yet." **(292)**

Your electricians will thank you kindly for providing a couple of portable wire reels (*LaRaus*). No jamming or kinking as they pull wire from manufacturer's coil. One man can pull three or more wires at same time. **(293)**

If your conference room is used to show movies in, you may want one of those lenticular roll-up wall screens (*Radiant*). The fellows over on the side can see just as well as those in the center. **(294)**

Chart addicts should go for Chart-Typer (*Continental*) in a big way. It's a new typewriter from West Germany. Has normal upper case alphabet and figures. But chart symbols—27, all different—instead of lower case letters. Easier to operate, they say, than a standard typewriter. **(295)**

Color-coded polyethylene plugs (*Protector Products*) will cure a hundred woes. Size is molded right into bottom of each plug. **(296)**

For an all-purpose material for repairs, why not try Plastic Mastic (*Williamson Adhesives*), an epoxy-polyamide compound with almost unlimited application. Easy to use. Can be sanded, drilled, machined to smooth surface. **(297)**

Big enough to cut steel strapping up to 1¼ in. wide and 0.035 in. thick. Small enough to slip in pocket when not in use. That's what we like about a new strap cutter (*Acme Steel*). For one-hand operation. **(298)**

To help you help retirees, present or future, there is a list of 43 booklets (*Government Printing Office*) covering food and housing problems, hobbies and spare-time activities, vacations and travel. **(299)**

When we think of 2-D flow diagrams and layouts, we always hark back to our pioneering friends (*Repro-Templets*) whose newest catalog lists templates of 15,000 machine tools and shop equipment items. They're printed on adhesive-backed acetate film, reproduce in most printing machines. **(300)**

Now you can print your own pressure-sensitive labels at point of use. With new table-top printer and die-cutter (*Brady*). At rate of approximately 110 average-size labels per minute. And halve your costs. **(301)**

Monitor is a 2½-lb. dry chemical fire extinguisher (*Ansul*). Bright red and shaped like a cannon ball. Spherical design, with resultant high center of gravity, permits effective one-hand operation and accurate control of flame-killing stream. Spent cartridge can be replaced immediately. **(302)**

Neatest and newest slide rule we've seen (*Cal-Math*) consists of two flat metal disks (anodized green and gold to eliminate error in use), plus a sliding calculator. Accuracy to thousandths. Easy to read. Extra-large graduations. Lots of air between scales. **(303)**

No leakers if your threaded pipe fittings are from the new Dryseal line (*Pipe Fittings, Inc.*). And they cost no more than old-style fittings. **(304)**

Cigar-shaped screwdriver (*Newage*) is air-operated, looks like a natural for light assembly. Drives all nuts and screws to same tension. **(305)**

Lining wooden tanks becomes pretty easy when you use polymer linings (*Wendnagel*) instead of lead, asphalt, or brick. For round or rectangular, new or old tanks. Custom-made to fit needs and conditions. **(306)**

Fewer fingerprints where you don't want them when operators are periodically checked with a perspiration meter (*Ameresco*). **(307)**

No waiting for fork truck to move palletized loads if you own a few Swivel King pallet rollers (*Ace*). They're so easy to push. **(308)**

Large products to paint? And no spray booth big enough to accommodate them? Airless spray coating (*Nordson*) takes painting to product. Almost no overspray, so operating in open area is perfectly feasible. **(309)**

You can build tables, benches, bins, racks, and shelves—mount switches and cables, gages, filters, etc.—with new structural system (*Versa-Loc*) consisting of mounting angle and clamp, latter available in four variations. **(310)**

Self-propelled scaffolding (*Castle*) means much less climbing up and climbing down. Wonderful wherever working height is 8 to 12 ft. **(311)**

More Ideas of the Month in Press Time Report following page 54

Landmark on The American Road

FORD *Motor Company Central Office Building*

950,000 square feet of ultra-modern office facilities for 3,500 employees, including a cafeteria seating 638 and auditorium for 500.

Architects: SKIDMORE, OWINGS & MERRILL, NEW YORK
General Contractor: BRYANT & DETWILER

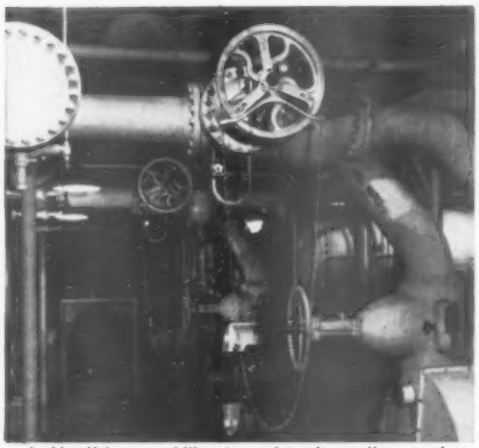
equipped with

JENKINS VALVES

because efficiency is a part of the over-all design

Beauty, comfort, efficiency — Keynote in the planning of Ford cars, this combination also was sought and clearly achieved in the Central Office Building of Ford Motor Company, Dearborn, Michigan.

With efficiency a part of the over-all design it is not surprising to see Jenkins Valves on the plumbing, heating and air conditioning pipelines in this superb building. For almost a century the name JENKINS has meant reliability . . . valves with the enduring quality to last the life of a building. It will pay you to have this important assurance when you specify or install valves, especially since Jenkins Valves cost no more. Jenkins Bros., 100 Park Ave., N.Y.17.



Jenkins Valves on chill water and condenser lines serving Ford building's 2,200-ton air-conditioning system.

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
JENKINS SINCE 1864
Jenkins Bros.

Sold Through Leading Distributors Everywhere

THERE MUST BE AN EASIER WAY

EVEN THE MOST EXPENSIVE DRAWINGS HAVE A RELATIVELY SHORT LIFE
ANYONE WANT A SLICE OF PICKLE?
SHE DOESN'T FILE DRAWINGS, SHE SHREDS THEM
FOR GOSH SAKES, STOP! IT'S LUNCH HOUR!
HEY, JOE— WAKE UP! YOUR DRAWING'S ON FIRE!
IF WE HAD A BLUEPRINTER* MAKE AUTOPOSITIVE PAPER INTERMEDIATES, WE COULD KEEP OUR DRAWINGS OUT OF HARM'S WAY

Much easier for you when you have your local blueprinter—or your own print room—reproduce your drawings on new Kodagraph Autopositive Paper Translucent.

You get positive photographic intermediates directly—creases, pickle stains, bottle rings are dropped out . . . weak line detail gains surprising strength.

The main thing, of course, is that your "hundred dollar" originals are safe in the files, and you won't go blind or mad when you read "Autopositives" or prints made from them. And the cost of these intermediates is so trifling—their line detail so impervious to smudging and spilling—you won't worry a bit when lunch is served.

Kodagraph
Reproduction Materials

EASTMAN KODAK COMPANY
Graphic Reproduction Division, Rochester 4, N. Y.

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Graphic Reproduction Division, Rochester 4, N. Y.

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Position_____

Company_____

Street_____

City_____

Zone_____

State_____

Kodak
TRADEMARK

By GEORGE A. HOY, JR., Industrial Management Editor, FACTORY

Surprised Visitor

The visitor in the cartoon is surprised to see John Jones's name in large print on the reception-room board. Why? Because he's John Jones.

John is visiting the Morse Twist Drill and Machine Company in New Bedford, Mass. Shortly a company photographer will appear, take his picture with the V.I.P. he has come to see. And before he leaves, John will get a nice souvenir of his day at Morse—his own photo in a folder.

Sputnik for Attendance

A shiny ball that could pass for a satellite hung above the heads of workers in the refrigerator controls department of Minneapolis-Honeywell Regulator Company all through January. Beneath it were the words "On the Ball." The words—and the big, shiny ball—meant that the department had kept absenteeism lower than any other department during the preceding month of December. The record: 2.4%—not bad for a holiday month.

Bright-Idea Winners

Money isn't everything, the saying goes. And the architects of the suggestion plan at giant Boeing Airplane Company (Seattle) take the saying to heart. Suggestors at Boeing win their cash award, just as they do at any other plant. But as an added incentive, each month's top award winner has the honor of being named man-of-the-month. And every man-of-the-month is eligible for the honor of being named man-of-the-year.

Last year the average suggestion award to men-of-the-month was $1903. The man-of-the-year won $5400. All were honored at a year-end steak banquet. And the man-of-the-year carried home something to impress his family—a movie camera.

Does this kind of promotion pay off for Boeing? You bet it does. The company's suggestion record is near the top of the list for companies of Boeing's size. And participation for 1958 was up 40% over the company's 1957 record.

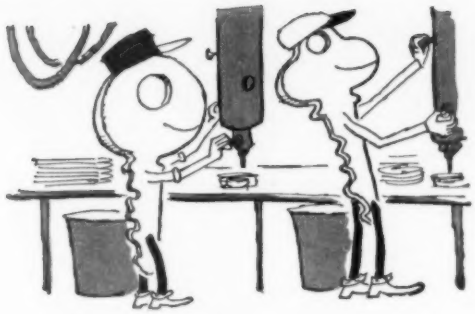
Work Cure for Cardiacs

Employees who suffer heart attacks may find your plant their best therapy, according to Dr. Alvin Slipyan of Human Resources Corporation (Albertson, N. Y.). Dr. Albertson observed 19 extreme cardiac cases employed by Abilities, Inc. (non-profit competitive organization for the handicapped, same city), for periods ranging from six months to 4½ years. He found that regular work improves the cardiac patient's prognosis, reduces his need for medication. Mental and emotional stress is common for patients who are severely restricted in their activities. And a not-too-demanding job often proves to be just the therapy they need.

Conclusion for your mental file: Valuable employees who wind up on the cardiac list can often come back to work, to their benefit as well as yours.

Well-Informed Tourers

New supervisors get a plant tour with a difference at Pittsburgh Coke & Chemical Company (Pittsburgh). What's different is the thorough picture of the operation they get first. They start with a movie (27 minutes) that tells the company story. Then hear a lecture about the plant, supported by a 49-page booklet. Booklet describes and shows flow charts of plant operations. Tour lasts for two to six hours, depending on the new man's job.



Every Man a Key Man

That's the way things are at Dewalt Division of American Machine and Foundry Company, Lancaster, Pa. Every man includes supervisors, salaried workers, hourly employees.

To drive this point home, Dewalt hangs "You Are the Key" posters throughout plant and office. Then holds contests to give the posters added meaning.

- A key factory employee is selected each month by a committee of top managers. To help their judgments, the committee designed a form for supervisors to use in nominating men for the honor. Winners get one share of AMF stock.
- Each month, a key supervisor wins two shares of stock. Winner is the man who comes up with the best work simplification ideas. Formula: ideas submitted × ideas accepted × dollar savings = score.
- Key office employee contest follows the general guidelines of the key factory employee contest.

Oldsters Measure Up

Latest research on productivity and old age comes from two Purdue University researchers. They studied the output of men between the ages of 60 and 65 at four Chicago companies—a steel mill, a man's clothing factory, a radio and television factory, and a photographic equipment plant.

Their conclusion: Men between 60 and 65 are just as productive as men 20 years younger. The same researchers report a gradual retirement system in use at Wm. Wrigley Jr. Company (Chicago).

Since 1950 the company has had a program of gradual retirement from 65 to 69. It's designed to break the shock of stopping work completely. About one-third of Wrigley's employees who have reached 65 have stayed on and gradually retired.

Here's how the program works:

When a person nears 65 he's asked if he wants to continue. If he does, a committee of executives considers his request on the basis of his ability to do his job.

Employees approved by the committee must take their regular vacations and an additional month the first year, an additional two months the second year, and so on. No one may stay on beyond age 69.

Only problem is with some supervisors, who try to persuade skilled workers to stay on. The company frowns on this, wants employees to have a completely free choice.

Saturday Holidays Coming Up

Wondering what to do about time off on Memorial Day and Fourth of July this year? Both fall on Saturday in 1959.

The Dartnell Corporation, Chicago, made a survey of 270 companies (in 38 states) to learn their plans on these holidays.

Here's what the companies reported:

- Salaried employees will be off the Friday before Memorial Day in 30% of the companies.
- Salaried employees will be off on the Monday after Memorial Day in 4% of the companies.
- Business as usual will be the rule (except for Saturday, the holiday) for 53% of the companies.
- The remainder aren't sure what they'll do.
- Plants will be closed on Friday before Memorial Day for 22% of the cases.
- Plants will be closed the Monday after in 4% of the cases.
- Work as usual will be the rule for 49% of the plants surveyed.
- The remainder haven't made up their minds.

The percentages for Independence Day are very much the same as those for Memorial Day.

Safe Driver for Sure

The happy man with the new car keys couldn't think of anything to say except "Thanks." And the 750 employees who had come to the drawing understood perfectly. Every other hourly worker at Kaiser Aluminum and Chemical Company's Chalmette (La.) Works had hoped he himself would be the one to drive the shiny new car home.

The drawing climaxed a 1,200,000 man-hour drive (100 continuous days) to beat the standing industry record of hours worked without a lost-time accident. The car, a color TV set, and a hi-fi (stereo) record player were part of the reward held out to employees during the drive. The other reward, of course—their own safety. The car and TV set could be won only by hourly workers. The hi-fi was a separate prize for salaried employees.

The drive didn't end the day the record was made. On record-smashing day, every employee got a pin stating, "I work in the safest aluminum reduction plant in the world." All outgoing mail is still stamped, "Number 1 in the Nation." Strings of signs dot the roadway, urging employees to keep going to 2,000,000 safe man-hours.

NOW! custom-made V-BELTS in any length with...

ALLIGATOR V-BELT FASTENERS

SIMPLE AS A, B, C!

When an endless belt breaks, merely cut off the required length of belt from a roll of Open End V-Belting, apply an Alligator V-Fastener and the machine is ready to "roll" again.

DESIGN NEW DRIVES WITH THIS IN MIND . . .

V-belts can now be made to any length . . . center distances are no problem . . . eliminate need for special length belts.

ONE STRONG JOINT

Permits fast and easy installation on all types of drives, particularly fixed center drives and drives with outboard bearings.

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BOOKS

By WARREN J. KING, Manager
Features and Departments, FACTORY

What Makes Them Uncommon?

Some men are uncommon to extraordinary degree, others to lesser. And perhaps most uncommon of all is the common man whose achievements are exalted beyond the expectations of his circumstances.

These brief, well-chosen words greet the reader of Crawford H. Greenwalt's book *The Uncommon Man* just before the first chapter begins. And they act as a guidepost to what is included in the pages that follow. In realistic and intelligent fashion, the president of E. I. du Pont de Nemours & Company presents an excellent case for recognition of individual abilities in the field of corporate management. As an example of this, he refers to the 34 top operating men of Du Pont. He's proud of the fact they fit no predetermined—if existent—executive mold: "The only common characteristic I can recognize in my associates is that they are all very able men and all, in their own ways, rugged individualists."

Mr. Greenwalt urges the establishment of maximum freedom and incentives to spur all personnel to superior effort. Then he outlines briefly how the compensation system and "hands off" policy of management now in practice at Du Pont is designed to do just this.

Over-all, the author's views are broad, solid, and well documented. This is particularly true of his analysis of the American business system and free enterprise. As the 10th president of Du Pont, Crawford Greenwalt is in an advantageous position to provide the reader with frank answers to many of today's most provocative management questions. And he does just this on the basis of actual experience.

His own philosophy of business management will offer the novice as well as the hardened professional far-reaching ideas on executive training and evaluation, political science, social organization, and the effects of tax policies on talented individuals, industrial and business corporations, and philanthropic institutions.

This is a book everyone in the management field will want to read. Much of its content was presented by Mr. Greenwalt in a McKinsey Foundation Lecture Series at Columbia University's Graduate School of Business.

The Uncommon Man—The Individual in the Organization, by Crawford H. Greenwalt. McGraw-Hill Book Co., 330 West 42nd St., New York 36. 160 pages. $4.

Political Guide for Business Men

Here's a guide on political action written for management people by a management executive with practical political experience from the precinct level up. It's not a discussion of the subject in broad generalities but a down-to-earth, practical how-to-do-it presentation.

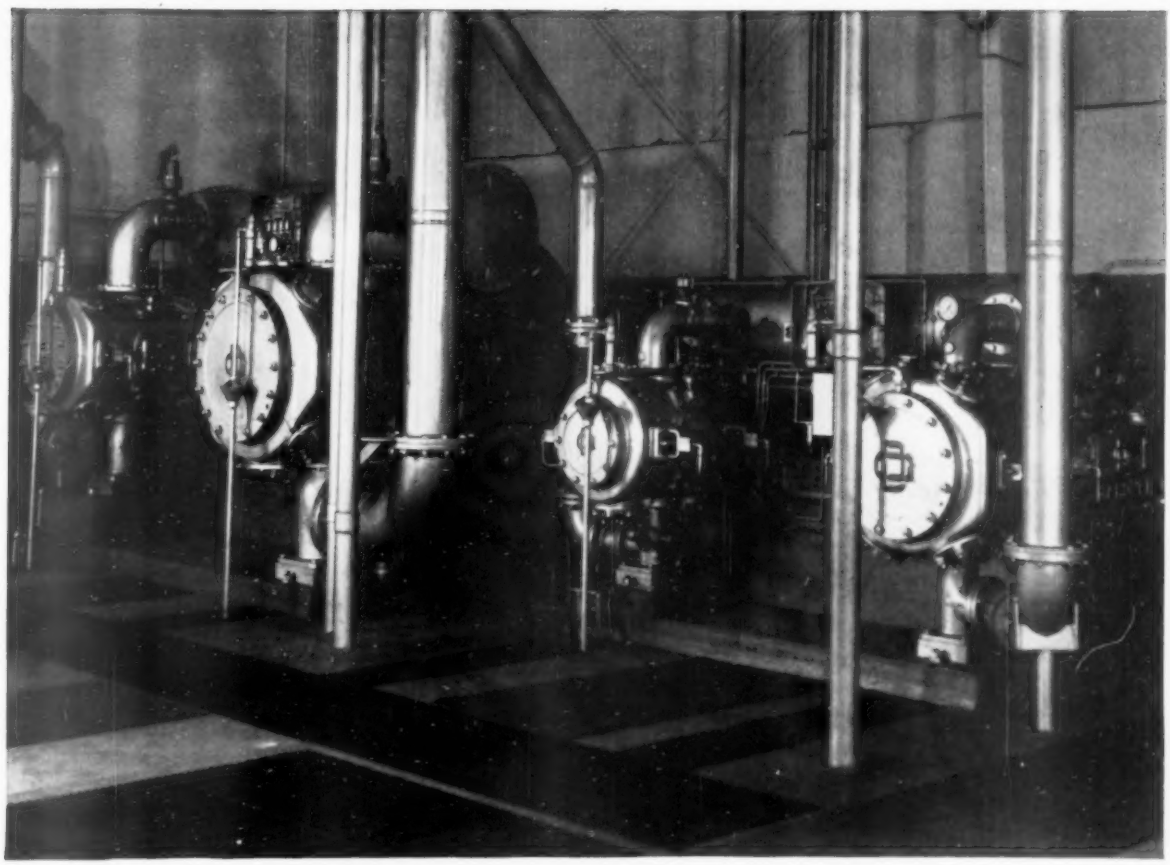
This book is particularly timely for the businessman. With the massive movement of labor leaders into the political and legislative arenas, the time has come for business men to make their stand known.

For this, the author presents a well-thought-out program. And the author's enthusiasm does much for his efforts. Starting with an over-all look at current political conditions and their impact on business, the author then covers various phases of political activity. Includes campaigning, lobbying, corporate public affairs activities, and legal do's and don't's. In conclusion, he offers a new approach to practical politics including a formula for political victory.

Despite all its good points, the book has one drawback. The subject matter does not lend itself to light treatment. So, in spite of all Mr. Wuerthner's efforts, the book in places is difficult to read.

The Businessman's Guide to Practical Politics, by J. J. Wuerthner, Jr. Henry Regnery Co., Chicago. 235 pages. $3.75.

Turn to page 169



New Gardner-Denver HAF compressor (left) now supplies all air for a large plant. HAC (right) was retained as a stand-by unit.

How to modernize your plant with a planned compressed air system

IN INDUSTRY—SPEEDING THE PACE,

the Gardner-Denver specialist is an integral part of the team. He works side by side with engineers and designers, helping to solve their problems, for at Gardner-Denver there's no substitute for men—our 100-year philosophy of growth.

In a sweeping modernization of its compressed air system, a large Midwest foundry recently replaced several small, power-eating compressors with *one* large Gardner-Denver HAF. The new unit is 23 & 13½ x 14, delivering 1750 cfm. Now the plant has a *planned* compressed air system—resulting in considerable power saving, and efficient air flow throughout the plant.

Even though the new HAF supplies all the air for normal plant operations, a Gardner-Denver HAC with a capacity of 750 cfm was retained as a stand-by unit. Other steps in the modernization included installing a new air receiver and a new, larger 8" air line.

It'll pay you to take a close look at *your* compressed air. You may find modernization with a planned system a big cost-saver. A Gardner-Denver compressed air specialist will gladly look at your entire system—your compressor installation, your distribution system, your air uses and your maintenance of air tools. He can recommend the best solution to any compressed air problems you may have.

GARDNER-DENVER Since 1859

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

1859 100 YEARS

Gardner-Denver Company, Quincy, Illinois

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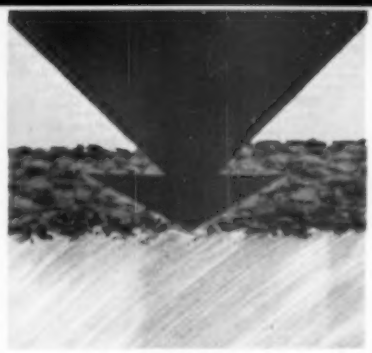
You
the
RUST-OLEUM®
RUST PREVENTIVE
STOPS
RUST!®
BEAUTIFIES AS IT

take brush!

Apply Rust-Oleum 769 Damp-Proof Red Primer directly over sound rusted surfaces. Saves costly surface preparations—lasts and lasts.



The **specially-processed** fish oil vehicle in the primer penetrates rust to bare metal—as proved in radioactive tracing studies.

Rust-Oleum, in its many forms, resists rain, fumes, heat, moisture, sun, and general weathering to stand up over the years.

Up to 30% more coverage with Rust-Oleum, depending upon the condition and porosity of the surface. Another Rust-Oleum difference.

See the many Rust-Oleum DIFFERENCES yourself!

Rust-Oleum primers and finish coatings are easily applied by spray. Flows smoothly . . . may be used in conventional, hot spray, or high pressure air-less spray.

A few easy strokes of the brush proves more than a thousand words . . . see how smoothly Rust-Oleum flows on . . . no pull, no drag . . . and it dries free of brushmarks. See, too, how much more coverage Rust-Oleum gives you . . . up to 30% more area depending upon the condition and porosity of the surface.

If your metal surfaces are *rusty* – simply brush or spray Rust-Oleum 769 Damp-Proof Red Primer right over the sound rusted metal after scraping and wirebrushing to remove rust scale and loose rust. The *specially-processed fish oil vehicle* in the primer penetrates rust to bare metal—driving out air and moisture. Easy as that to Stop Rust—and save time, money, and metal.

For *lasting beauty* – follow up with a Rust-Oleum finish coating in the color of your choice – from grays, greens, blacks, and aluminums to yellows, blues, whites, or browns – or from the many popular pastel shades.

That is the Rust-Oleum *System* of primer and finish coat for maximum over-the-years protection. A system that is measured by the money you save. Specify Rust-Oleum for maintenance, new construction, and re-modeling. Your Rust-Oleum Industrial Distributor maintains complete stocks for prompt delivery . . . he will be happy to consult with you on your coating problems.

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Please send me the following at no cost or obligation:

- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer for rusted metal surfaces.
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An exclusive *TRANTER advancement
in heat transfer technology

MULTI-ZONE

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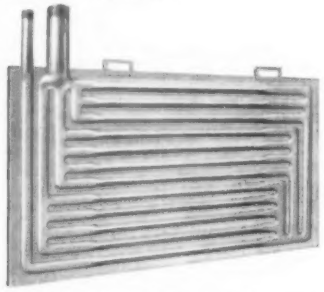
DESIGN

*PATENTS APPLIED FOR

Years ahead performance plus all of the time-proven PLATECOIL advantages over pipe coils

The new MULTI-ZONE PLATECOIL features a multiple header configuration for improved steam distribution. The resulting increase in effective heat transfer area provides a built-in reserve capacity to deliver more heat during "start-up." It also speeds temporary recovery after introduction of work loads or processing ingredients for closer process control. Decreased condensate "trapping" produces FREE-FLO action.



A.S.M.E. APPROVAL FOR 250 psi. now makes it possible to apply the cost-cutting advantages of PLATECOIL to a new range of heat transfer problems. DURAWELD construction with TRANSTEEL mill-controlled mild steel provides a safety factor of 4 to 1 at 250 pounds steam.

Replace pipe coils with the new MULTI-ZONE PLATECOIL and save on tank space, fabricating, installation and maintenance costs. Factory-fabricated PLATECOIL is available in a wide variety of sizes and styles including single embossed, double-embossed, banked and rolled units in TRANSTEEL, Stainless, Carpenter 20, Monel, Hastelloy C and Nickel.

WRITE FOR NEW BULLETIN P60
for complete specifications and data.

Tranter Manufacturing Inc.

LANSING 9, MICHIGAN

PLATECOIL® DIVISION

For more facts circle 538 on Reader Service Card

Begins on page 164

Electrical Field Once Over Lightly

If your job demands a basic but not complete understanding of electrical equipment, this book is for you. Its 31 chapters originally appeared in *Electrical Wholesaling*. They cover subjects ranging from motor controls and sound systems to pole line equipment.

The authors are aiming their efforts at men who lack technical background or intense interest in electrical equipment. They discuss seldom-used equipment briefly, treat popular items at length, include almost no mathematics. And emphasis is on purchased equipment rather than engineered apparatus.

Most appreciated by readers will be the clever, competently done drawings combining basic data and diagrams in illustrations. The book's main shortcoming is that it doesn't explain the reasons behind equipment application limitations.

Electrical Equipment Manual, by J. F. McPartland and W. J. Novak, Electrical Wholesaling (a McGraw-Hill publication), 330 West 42nd St., New York 36. 174 pages. $4.

Mowing Manual

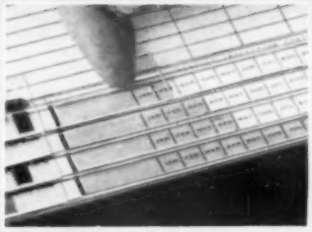
First privately published five years ago by the TVA, *Grounds Maintenance Handbook* is now regularly available in a revised and enlarged edition.

There's still plenty in this manual that's more appropriate for the state park commission than the Whammit Manufacturing Company. But the Gizmo Division out in Cornbelt will find plenty of useful information on caring for its 100 acres of grass, the 1000-car parking lot, the walkways, access roads, etc.

If groundskeeping is a major problem for your company, you'll want to be sure and get this book. For the plant with minimum grounds, it's a nice reference, but it'll be on the shelf more often than off.

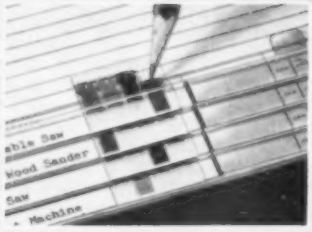
Grounds Maintenance Handbook, by H. S. Conover. F. W. Dodge Corp., 119 West 40th St., New York 18. 538 pages. $10.75.

PREVENTIVE MAINTENANCE RECORD SYSTEMS CUT "DOWN" TIME



ONCE A MONTH

PROGRESSIVE signals, always visible, show the inspection schedule on a monthly basis. Various colors designate type of work to be done. When work is completed and entered on record card, signal is advanced to month in which next inspection is due.



ONCE A WEEK

LOCK-IN CHAIN signals . . . 4 windows each a different color, reveal the week within the month when inspection is to be made. With both month and week signalled, you avoid missing semi-monthly inspections or those requiring more frequent attention.

More and more, increased production depends on effective maintenance. The secret of successful Preventive Maintenance is accurate scheduling and rigid adherence to the schedule.

Acme Visible record equipment, with Acme hinged pockets and the two cards on one hanger feature, is ideal for follow-up control. Each machine and motor is listed on an individual card placed in the back of pocket—in facing pocket a "History of Repairs" record is placed, with signals *always visible*, to indicate the next inspection or lubrication date. "Spare Parts in Stock" record card is hung on the same hanger as pocket carrying "History of Repairs" card.

ACME VISIBLE RECORDS, INC.
CROZET, VIRGINIA

DISTRICT OFFICES AND REPRESENTATIVES IN PRINCIPAL CITIES

ACME VISIBLE RECORDS, INC. Crozet, Virginia

☐ Send us more information and literature on Preventive Maintenance.

☐ We are interested in Acme Visible equipment for _____ records.
KIND OF RECORD

☐ Have representative call. Date _____ Time _____

Company _____ Attention _____

Address _____

City _____ Zone _____ State _____

FM-459

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says: DAVID TESONE TRUCKING CO.

"After installing larger engines in some of our trucks, we began to experience transmission failures due to faulty lubrication. We tried several types of gear lubricants without success, until we tried LUBRIPLATE APG #140 Gear Lubricant. Then our gear troubles ended. We are also getting outstanding results from LUBRIPLATE 630-2 in chassis and wheel bearings of our 40 heavy duty trucks!"

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REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

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For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

FACTORY FILMS

From Sea Sands to Better Welding depicts the steps involved in mining rare minerals for electrode coatings. Shows how millions of tons of mineral-bearing sand are moved and processed to obtain basic material for better welding. 16mm, color, sound, 18 min. For loan, write:

Hobart Brothers Co., Box DM-95, Troy, Ohio.

You Can Handle It is a training film to help prevent materials handling accidents. A combination of humorous cartoon sequences and real life action, it demonstrates proper and improper methods of lifting, carrying, stacking—every kind of manual handling. 16mm, b&w, sound, 10 min. For sale, write:

National Safety Council, 425 N. Michigan Ave., Chicago 11.

Electric Furnace Fume Control covers collection of dust and fume from electric steel furnace installations. Film combines diagrams and commentary with photographs of actual installations of Dustube Fume Control systems. Illustrates three types of hooding, with operation and advantages of each. 16mm, color, sound, 20 min. Write to:

Wheelabrator Corp., Dust & Fume Div., 1115 S. Byrkit St., Mishawaka, Ind.

Mr. Finley's Feelings depicts a day in the life of an average man whose tensions get him into difficulties. No "rules" for emotional health are given but the story will provoke thought about the anxieties, tensions, and stresses of day-to-day living. Includes discussion leader's guide. 16mm, color, sound, 10 min. For loan, write:

Association Films, Inc., 347 Madison Ave., New York 17.

The New Era of Refuse Collection traces the history of waste collection and points up some present-day problems with animated cartoon sequences and a musical score. Solutions presented on the various problems were filmed on location at well-known plants. Color, sound, 15 min. Write to:

Dempster Brothers, Department F-71, Knoxville 17, Tenn.

ADAMS FACT FILE #2

PLANT AIR

Moisture Chief Cause of Trouble . . .

Every company today is looking for ways to offset the increased costs of labor, material, equipment and services. At a gasoline station you expect "Free Air", but in industry it is a major expense. Perhaps in your own plant, for an investment in a few minor compressed air system alterations, significant savings are possible.

Water, sludge, rust, oil and dirt in compressed air systems are prime causes of maintenance and production down-time. Water vapor condensing in air lines tends to corrode the piping. Also, water present in the piping may freeze during winter, causing serious reduction of compressed air supply. Such restrictions are often difficult to locate and thaw. This same line moisture may emulsify lube oil destroying its lubricating value and the resultant mixture has high fouling characteristics. Frequently, ice will form within the tool itself since expanding air cools the moisture . . . tool efficiency will be seriously affected.

Some of the Other Problems Created By Wet Compressed Air . . .

Wet compressed air is not only a construction and production tool problem. Faulty paint jobs, contaminated chemical and food products can often be traced to moisture laden compressed air. Waterhammer, unequal pipeline thermal expansion and line leaks also result from collected moisture. In addition, air lost through traps, and in blow-down of compressed air lines provide no useful work . . . represent a sizeable power loss.

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For further information on how the complete line of Adams air equipment can solve your compressed air problems, write today for your free copy of Bulletin No. 712 on Aftercoolers and Bulletin No. 117 on Poro-Stone Air Filters from the R. P. Adams Company, Inc., 215 East Park Drive, Buffalo 17, New York.

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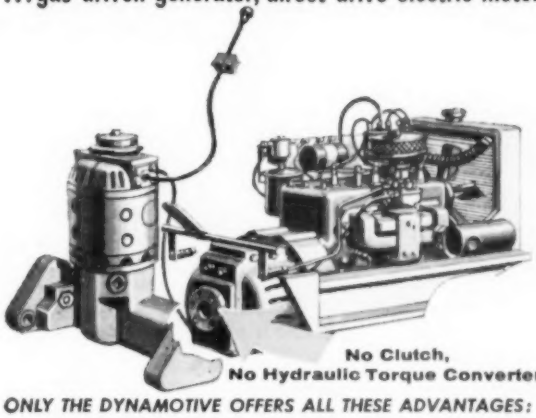

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159 Ways to Build Low-Cost

Planning a new plant? Updating, repairing an old one? It's your best chance—could be your only chance—to make low-cost maintenance a sure thing.

SHOPPING around for a new plant building? Or looking for a cheaper modernization job? Trying to get your engineer-architect to cut some design corners to shade prices? Looking for the lowest cost-per-square-foot bargain?

It could happen this bargain won't turn out to be one 5 to 10 years from now. And that the plant with the 10% extra guts in it is by far the better buy. For first cost isn't the only cost. The time has come—in fact it's overdue—when you should buy plant buildings and facilities with the same finesse as production machinery and other plant equipment. You don't look only at first cost—you also consider annual operating cost. And you shun features that will cause you a continuing maintenance headache.

WHERE TO BEGIN

Low-cost building maintenance begins with design. Any plant engineer or maintenance manager will agree to that. This involves the choice of the most suitable materials and accessory equipment. They are not always the cheapest. True, first cost is influential in the choice, but not decisive. How then can a plant owner make sure the purchase of a higher-priced item is justified? In several ways:

- Discuss the item with your plant operating people—those in charge of production, maintenance, plant engineering, industrial engineering, and other supporting personnel. They should be able to evaluate its merits and project its future cost performance.
- Get comparative cost figures—initial, and annual operating and upkeep costs—from manufacturers of competitive offerings. (See "Cost Comparisons You Can Trust," FACTORY, November 1958.)
- Draw on the wide experience of your engineer-architect or consulting engineer, particularly where items are new and relatively unknown to your own plant people.
- Pick up new ideas from other plants—from those in your own industry, and even from outside industries. For example, you'll find a gold mine of such ideas in the 159 maintenance cost-cutters that begin on the facing page. This list was largely drawn from the experience of engineers of The Rust Engineering Company of Pittsburgh and Birmingham. At FACTORY's suggestion Rust canvassed its engineers for ways to cut building maintenance costs in original design.

This 159-item list doesn't cover the waterfront by a long shot. The possibilities are almost infinite. Once you study the list you'll be inspired to add many more to it. Admittedly these ideas spring mostly from application in the heavy-process and heavy-fabrication types of plants in which Rust Engineering has specialized. But in principle they apply across the board.

The point remains that these 159 ideas show how you can cut building maintenance costs by paying less attention to first cost and more attention to annual "owning" costs. There's no idea of gold-plating here—that is, unless it pays.

HOW TO LOOK AHEAD

This is the basic philosophy that plant owners must learn. It means that the cheapest plant to build is not always the cheapest plant to own. Savings in material and accessory equipment costs may be wiped out by continuing high maintenance and operating costs. The owning cost of what may appear to be expensive refinements may prove over the years to be lower than the least-first-cost buy. Of course, sometimes you'll never know how much lower, because the more expensive way may have averted a catastrophe. Or it may have eliminated a serious repair you would have had to make without it.

Most often, however, justification of the best buy among competing materials and designs is possible in the design stage. You can base it on a comparison of the life of each item, plus accumulated costs of upkeep and repair, plus the accumulated penalties of disruption of production, equipment downtime, and product spoilage.

In this selection, Rust engineers agree, you start your analysis from the finished package. You decide first what kind and length of service you expect of a facility. Then you work backwards in fitting in the components so as to realize your objective at lowest "owning" cost. Two examples:

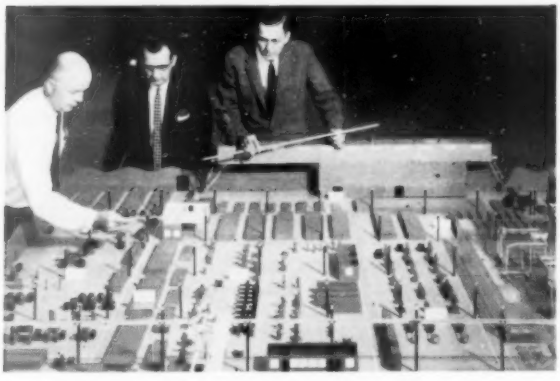
- On the economy side: use of curtain expansion walls on those sides you intend to push out later.
- On the expensive side: installation of over-sized pipelines and other plant utilities in anticipation of expansion.

Both these examples make economic sense. And they do reflect two main points: Don't select a plant building only on the basis of immediate capital outlay. Do include a forecast of maintenance cost in your choice of design and materials.

These 159 ideas will illustrate the scope of this kind of thinking. Some of them are small in cost or detail, yet to ignore them is to invite costly and continuing repairs. Repetitive maintenance is like the hat check—over the years you pay for your investment several times over. Best way to cut your maintenance costs is to eliminate or minimize the need for it. These ideas will do just that.

Maintenance Into Your Plant

BUILDINGS



Before you build, better decide what you want.

Do you have to enclose all operations inside a roof and walls? Often a roof alone will do. Sometimes only a small building will hold operations controls and employee services, with all else open to the sky.

- If building is over 250 feet long, use expansion joints in structure and wall enclosures—roof coverings, too—to prevent damage caused by thermal movement. This also applies to the junction of a long wing to a main building.
- Use I-beams for rafters wherever possible. They are easier to paint and keep clean. They provide greater headroom than fabricated truss.
- Post or mark allowable floor loadings in areas subject to overloading.
- Guard columns, downspouts, and walls in trucking areas. Consider bumpers for truck loading docks.
- Don't overlook the maintenance economies you'll have with stainless steel and similar alloys despite their higher initial cost. Stainless steel, for example, is available in many shapes, forms, and manufactured products for use in roofs, gutters, downspouts, fences, curtain-wall panels, piping, structural components, and fasteners of all kinds.
- Plan adequate foundations and anchoring for equipment that can cause undue vibration and cracks. Consider feasibility of mounting equipment on frames supported on vibration isolators to minimize vibration transmission through building structure.
- Where severe corrosion requires frequent replacement of structural elements, consider heavy-wall round pipe or tubing instead of mill shapes. It corrodes evenly on its surface, can be watched more easily for weak spots or flaws.

GROUNDS

Most people judge your plant by its outside dress.

Doesn't matter whether you spend a little or a lot for maintaining attractive grounds. There are basic rules for laying them out that will whittle down your building maintenance costs.

- A snow-melting system under employees' walks and truck entrances cuts emergency snow-removal costs. Where fork trucks must traverse outdoor areas, this system can prevent costly traffic tie-ups. It can also forestall road maintenance headaches that inevitably result from snow or ice.
- Where traffic warrants, provide smooth-surface paving around plant property (such as asphalt or concrete instead of dirt, loose gravel, or crushed stone). Road maintenance is lower and in-plant traffic is less hindered in bad weather. See that all roadways are well graded and drained.
- Provide adequate drainage facilities to prevent soil erosion. In sizing dry wells, drains, and storm sewers, search the Weather Bureau records for maximum rainfall statistics.
- Grade plant grounds gently and evenly to low points and provide growth of grass or similar ground cover to prevent soil erosion from wind or rain.
- Keep ground floors well above grade. Slope the ground away from buildings to minimize moisture under foundation and ground floor.
- Provide clean, hard-surfaced employee entrance walkways to minimize extra floor cleaning costs due to tracking of dirt and water.
- Provide a narrow strip of crushed stone around perimeter of building at base of walls to prevent unsightly mud splattering.

Turn the page

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WALLS AND OPENINGS

New prefab panels can combine long life with beauty.

The criterion of weight per cubic foot is old fashioned today. Whether you're looking for a blank building wall just to keep out the weather, or a wall to provide close indoor environmental control, today's choices of lightweight wall and partitioning materials will do either at low maintenance cost.

- Consider glazed tile walls and washable floors, such as tile or terrazzo, to cut maintenance and sanitation costs. Such walls are easily cleaned and floors mopped or hosed. Cinder-block or concrete-block walls with glazed finish or paint have similar advantages.
- When you have a steel-frame building, use prefab panel walls instead of solid masonry walls to eliminate cracking caused by structural expansion and contraction.
- In topping a masonry wall use through-wall flashing under parapet wall coping to prevent penetration of rain water. Leaks could cause spalling, efflorescence, and damage to coping mortar joints and lower interior.
- Calk around door and window frames to prevent damage to interior paint and properties from penetration of dust and water. Use of newer, costlier synthetic rubber-base sealants, which are non-hardening and have long life, eliminates need for periodic re-calking. And use of "plastic" putty cuts sash deterioration.
- For interior walls that are subject to fumes, dust, and vapor, use ceramic glazed tile. You can clean it with a wet cloth, and you never have to paint it.
- Avoid high masonry parapets where possible (firewalls are an exception). They're a source of leaks and related repair costs to exterior and interior of building.
- Don't build your boat in your cellar. Consider provision of big doors or removable panels to permit easy pass-through of large equipment for manufacturing operation or for equipment repair.
- Waterproof the exteriors of below-grade concrete walls. Consider protection against water leaks—perhaps by a special concrete—in sections below water-table.
- Use rustproof fasteners (such as aluminum, or cadmium-plated or stainless steel) for attaching siding or roofing panels. Avoid galvanic corrosion in contacts of dissimilar metals by long-lived, adequate insulation, such as neoprene separators or washers.
- If parapets are needed, reinforce them horizontally and vertically to minimize cracking. Provide expansion joints at least every 60 feet of length.
- When thermal insulation is required on walls, take care to prevent cracks or leaks that allow wet weather or wet process to saturate and destroy effectiveness of insulation. Replacement is expensive.
- If you're using concrete tilt-up slab construction, use polyethylene parting sheets when pouring or casting slabs. They yield a slick, smooth face that resists dirt, minimizes painting and upkeep.
- Where operation can cause condensation, provide preventive insulation on cold walls and roof ceilings.
- Consider antifriction bearings on door hinges where corrosion is a problem.
- Consider rubber swinging doors or mechanical or electronic door openers where in-plant materials-handling traffic is heavy.
- Use doors and frames of metal, such as steel and aluminum, to obtain better service and longer life. They don't warp or splinter.

FLOORS

You won't find any one best floor for every service.

Floors are probably the most-used but least-considered elements in building design. In spite of the wide selection of available floor materials to match specific types of operations and to combat all sorts of wear, most maintenance managers will agree that floor care can be a blood-sucker in the maintenance budget if the floor is poorly designed and installed.

- Apply a concrete floor hardener on concrete floors to reduce dusting and wear. It extends life of floor at moderate cost.

• Where concrete floor is hosed down, see that it is sloped a minimum of ⅜ inch per foot for drainage. Make all working areas and passageways the high points.

• Don't rely on normally spaced floor drains to relieve flooding. Individual drains are intended only for dry areas subject to a little hosing. Provide continuously wet floor areas with trench drains.

• Consider concrete curbs poured integrally with the floor slab at all wall junctions, to prevent leakage from upper floors or service levels through construction cracks between sidewalls and floor.

• In wet areas elevate metal bases of facilities and equipment above floor level to minimize rusting. Set equipment (such as tanks, motor bases, conveyor supports) on concrete pads, brickwork, or wood blocks.

• Where areas may become wet or flooded, raise and slope floor away at stairways, doorways, elevator, and other openings. For doorways to electrical control rooms, provide raised sills or curbs, with ramp approaches on both sides for easy movement of electrical equipment.

• Use polyethylene film under concrete floors poured on grade. Insures slower and better curing of concrete and keeps ground moisture from rising through slab, stopping surface disintegration, equipment corrosion.

• Provide concrete or cement filler where building columns pierce floor, thus keep water from columns, protect them against undercutting by corrosion.

• Provide metal floor plates or easily replaceable wood blocks at places that are subject to heavy floor traffic and wear, such as entrances to freight elevators and traffic interchange points.

• Avoid pouring a concrete slab in direct contact with a masonry wall. Shrinkage of concrete tends to crack wall.

• Set your locker-room lockers up on curbs, to make machine scrubbing or hosing down of floor easier.

• Hang toilet fixtures on wall and suspend compartments from wall and ceiling for easy floor cleaning.

• Size and lay out a floor drain system intended for process waste according to kind and quality of waste. For example, provide large-diameter drain with minimum bends for viscous or fibrous waste products. And provide adequate slopes in horizontal runs, cleanout plugs at bends, flushout nipples at strategic locations.

• Waterproof any of your floors that may become wet above an electrical control room.

• If upper levels or floors of a curtain-wall building are subject to hosing or wet process conditions, provide curb on floor perimeter to prevent leakage between curtain wall and edge of floor to space below. Provide a surrounding curb to prevent seepage under wall in control rooms with concrete-block walls in a wet area.

• To avoid slippage, see that top finish on concrete floors in wet locations is given a float finish, not a steel-troweled finish. Or imbed non-slip additives or apply non-slip coating or coverings.

• Instead of floor mats at factory and office entrances, consider a removable open grille with drain pans below (both of stainless steel) to catch snow, rain, or dirt and keep it from being tracked into building. This also eliminates entrance mopping.

• Where excessive moisture or water prevails, consider quarry tile, or split brick finish, or special concrete additives or aggregates.

• Where weight is a factor in open-grating metal decks, consider light metals such as magnesium.

WINDOWS

You don't have to have any windows at all, you know.

Windows usually add to original building cost—and maintenance expense. Unless you need them for outdoor light or vision, consider a windowless building design. Modern air-conditioned premises don't require windows for ventilation.

• Where glass-pane breakage can be a problem, use plastic lights, which need no replacement. Use clear plastic for vision windows, translucent plastic for non-vision spots, tinted plastic to cut heat or glare.

• In corrugated wall-panel construction, consider substituting corrugated translucent plastic panels for traditional metal sash with glass lights, thus save on periodic sash maintenance painting costs and broken glass replacements.

• Use rust-resistant louvers instead of operable sash to control natural ventilation. It solves bent or broken sash repair problems.

• Consider rust-resistant sash, such as galvanized or aluminum, not only to eliminate periodic painting maintenance, but also to minimize sash, frame, and sill repairs of damage from rusting.

• See that both sides of sealed or fixed vision windows that need regular cleaning are easily accessible from within and without—to minimize cleaning costs. If shrubbery or foliage is going to interfere, consider installing special built-in mechanical aids, such as overhead trolley and cage arrangement for suspension of cleaner. Another solution: Provide reversible pivoted windows of aluminum or stainless construction, with "pneumatic tube" seals, that can be cleaned on both sides from the inside.

• For administrative buildings, consider decorative stone window sills, such as polished marble. They are impervious to deterioration from heat, moisture, and sun and require little maintenance except cleaning.

• Consider glass-block design where only light but no window ventilation is needed. It eliminates sash maintenance, reduces window breakage.

Turn the page

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ROOF

Roof must be good to resist sun, frost, wind, and rain.

No matter how good your roof, it needs periodic inspection to detect the freak effects of sun and storm before they compound into a need for a serious repair job. But a poor roof will plague you with nuisance repairs interminably.

• Choose roof decking that promises long life and often eliminates interior ceiling painting and maintenance. For example: cores or slabs of precast concrete or other light inorganic materials such as fiberboard, glass fiber, and other mineral products, also galvanized steel or aluminum roof decking. In some cases extra properties of noise absorption and thermal insulation offer added benefits.

• Provide curbs for mounting all roof-top equipment (such as a ventilator) that penetrates to interior below, to prevent leaks. Use cant strips in flashing to such curbs, as is usually done at roof perimeter in flashing to parapet, for easier application of flashing and better results.

• Attach a deflector hood or skirt around roof ventilator pipes and similar projections, near roof level, to shed water away from the curb mounting.

• Wherever a support or brace penetrates roof covering, such as a tank leg or guy wire, use a pitch pocket to prevent leaking; i.e., a projecting metal sleeve that surrounds the support and is flashed to roof covering and filled with roofing pitch.

• Where there's any likelihood of walking on a gravel-surfaced built-up roof, provide a protective walkway. If walkway is made of wood, use treated lumber that will resist deterioration, require no painting. Make sure walkway is laid before gravel surface is applied, so that holes won't be caused by punching the gravel through surfacing.

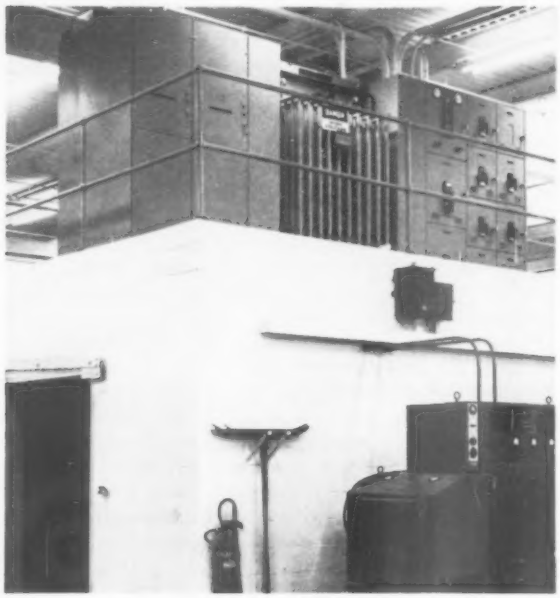
• Use rustproof gutters and downspouts (where feasible) to minimize repair bills caused by corrosion. Consider steel interior downspouts to eliminate maintenance problems caused by freezing.

• See that expansion joints in roof match expansion joints in walls.

• Provide enough roof drains to prevent overflow at edges, which mars walls, erodes ground below.

• Provide permanent ladders for easy access to each roof level, to facilitate job of periodic inspection and minor repairs.

ELECTRICAL SYSTEM



A cut-the-corners system will invite power failures.

Continuity of power supply is an attainable goal in every plant electrical system. But your only guarantee against sudden breakdown is continuing inspection and upkeep. You can multiply the cost of necessary electrical maintenance by skimping in small ways on your system design and equipment.

• Protect operating handles on electrical controls with guardrails to prevent accidental tripping.

• Where there are dust and other atmospheric contaminants, place electrical controls in pressurized room or smaller enclosures and filter all incoming air.

• Provide slide rails under stators of large synchronous motors (especially where they are not located in a crane bay) so you can shift them axially to expose pole faces. This permits easier motor inspection, maintenance, and overhaul.

• Provide electrical equipment with adequate short-circuit capacity to prevent disastrous system failure in case of an electrical fault.

• See that all electrical distribution and utilization equipment you purchase meets the requirements of ambient temperature and atmospheric conditions. When insula-

tion is exposed a few degrees beyond rated operating temperature, you shorten its life drastically.

• Choose package motor-control centers, thereby grouping controls, in preference to racks of individual motor-control units. Control centers eliminate unproductive traveling time in scattered maintenance, promote more efficient servicing.

• Where circuitry is likely to change, provide rack, tray, or channel construction for support of cable or wire, thus obtain faster changes at lower cost.

• Provide highest possible plant ditsribution voltages for main and secondary feeders, thus minimize number of conductors to maintain.

• Choose air circuit breakers for all plant voltages up to 15 kv. in preference to oil circuit breakers. They need less attention.

• Locate circuit breakers, switching equipment, and motor controls away from hazardous areas (wet, dusty, explosive). This way, you can use open-type equipment, thus simplify your maintenance.

• Use the principle of plug-in or draw-out construction in selecting equipment, in preference to the built-in or wired-in type. Such equipment is easier to inspect, maintain, repair, or replace.

• Use red or pink color when encasing an underground conduit bank in concrete. It warns workers against piercing or accidental cutting.

• Install ground-detecting equipment on ungrounded delta systems to signal ground faults.

• Insist that all wires and conduits in junction boxes and control panels be identified. Where possible, mount circuit diagram on control panel cover and protect it with transparent covering.

• Use terminal blocks for all low-voltage and control circuits where trouble-shooting may be necessary.

• Keep away from outdoor overhead control lines. For underground control cable, use the best moisture-resistant grade available.

• Use flexible conduit to all motors and other equipment that is subject to relative motion, thus make your replacement job easier.

• Install meter test blocks for portable instruments in each feeder cubicle in switchgear. Even better, provide built-in metering. You need meters to know what's happening in your distribution system and when there are harmful overloads.

• Provide distribution circuits with alternative feeds, so you can work on distribution equipment during regular shift hours rather than on overtime.

• When substations are mounted in outdoor structures, use construction that requires a minimum of maintenance. Remember, leaks or building damage may go unnoticed until they damage electrical equipment.

• Mount electrical junction boxes for equipment subject to splashing on the side away from such conditions.

• When conduit runs near or contiguous to excessively warm equipment, make sure properly rated electrical insulation is used inside it.

• Set up a complete circuit numbering code for the entire electrical system, keep it up to date. Mark all switches, feeders, and controls accordingly. This allows maintenance crew quickly to cut off power to equipment needing repairs, guarantees safe work.

• Use non-shielded cable for voltages of 5000 and under. No stress cones are required.

• Provide air-cooled transformers instead of oil-insulated, where you can, to eliminate oil maintenance.

• Where machine or equipment layout changes are frequent, use plug-in busways for fast, low-cost moves.

• Leave plenty of room around control and switchgear equipment for easy, safe work by maintenance crew.

• Consider installing underfloor duct in office, administrative, and similar working areas for communications, power, and lighting. You will gain flexibility and time in making changes.

LIGHTING

The right fixtures can halve your lighting maintenance bill.

Good lighting helps you make a better product. But lighting has to be kept good by planned cleaning of fixtures and by periodic lamp replacement. There's no ducking this continuing expense. But there are several ways of minimizing it.

• Consider long-lived lamps, such as fluorescent or mercury-vapor, instead of incandescents, to cut relamping costs. When using incandescent, specify lamps with voltage rating at least equal to operating voltage, thus minimize burnouts.

• Consider disconnectable and lowerable hangers for inaccessible high-bay or outdoor lighting.

• Consider a 277-volt system for fluorescent or mercury lighting, located at safe heights above 12 feet, thus obtain a system that requires a minimum of distribution system to be maintained.

• Choose a lighting installation that requires fewest fixtures consistent with eye comfort—to cut cleaning costs. Where feasible, locate fixtures so access is easy and so a single setting of scaffold will handle a maximum number.

• Don't use fluorescent lamps in areas where lights are frequently turned on and off. Use incandescent type, which are unaffected by frequent switching.

• Select fixtures that promote self-cleaning by natural ventilation. Where fixtures in dusty or dirty areas will need frequent cleaning, choose a type that can be easily dismantled and cleaned.

• Provide high enough light levels in locker room, washup, storage, and similar areas to highlight dirt or disorder. This will encourage employee tidiness, thus lessen work of cleaners.

Turn the page

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PAINTING

When you paint for protection, you can get good looks for free.

Ideal plant design will eliminate the need for painting by providing surfaces you won't ever have to paint. Painting for protection costs more than painting for appearance. In some chemical plants it can run to 20% of the total maintenance bill.

- Minimize re-painting of your factory walls, especially in passageways, by providing either a guardrail or a concrete wheel curb to prevent scraping and gouging by passing traffic.
- Do not color-code entire surfaces of pipelines—an expensive painting job. Use same color chosen for best lighting or decorative effect and apply 1- or 2-in. adhesive banding at, say, 10-ft. intervals. Or paint bands at intervals. In small areas bands at wall entrance and exit may suffice.
- Where color coding of any kind is used, keep it up to date for all changes. This practice eliminates wasted time in unnecessary hunting, allows quick tracing, promotes proper safety precautions, and sustains confidence in the system.
- Mark aisle borders to ease work of operators of mechanical floor cleaning and housekeeping equipment and to speed waste disposal trucks. Use aisle-marking paints, adhesive stripes, or traffic disks.
- Set up a protective painting program as early as possible for selection of the best coatings for all types of surfaces and exposures. It's much cheaper in the long run to spend more money for paints and proper surface preparation than to have to paint more frequently to prevent corrosion or to have to repair or replace poorly protected facilities.
- Where atmospheric or chemical corrosion is a threat, specify proper shop coats, thus save on maintenance repainting of steel surfaces of structure and equipment. For best results, use steel from which mill scale has been removed by blasting or pickling. Or if appearance is not important, don't apply any shop coat, allow steel to weather a year or so, then paint.
- Consider application of silicone-base water-repellent paints or coatings on porous building surfaces to minimize moisture damage.
- Where finish paint is required on new construction or alterations, do the job before area becomes hard to reach or inaccessible.

AIR HANDLING

A system is no more reliable than its weakest component.

Of all equipment in a plant, the air-handling system probably has to run longest without stopping. Manufacturers therefore design primary equipment for tough service. This means breakdowns usually occur in the weaker parts of the system that require a heavier maintenance schedule. With a better system design you can ease that maintenance load.

- Plan the entire duct system when planning the building, to save on ductwork, cut duct maintenance and cleaning costs. For example, locate equipment room on outside wall for intake valves or louvers, thus eliminate an intake duct system.
- Provide separate ventilation of local sources of fumes or corrosive vapors to minimize deterioration of main ventilating system.
- Insulate supply ducts and, when economically feasible, return ducts also, thus not only cut operating costs but also minimize sweating and corrosion.
- Keep duct system as simple as possible for maintenance by semi-skilled men. For example, provide plenty of access panel or cleanout doors for easy cleaning by a labor crew. And use quick-opening or spring fasteners instead of bolts or screws.
- When duct systems are likely to handle corrosive air, consider corrosion-resistant materials such as special metals, plastics, plywood, or linings of special protective coatings. Consider such materials for canopies, hoods, ductwork, fans, and exhaust piping.

Turn the page

Vibration test of ingot bundle. Signode vibrator handles up to 3 tons at accelerations over one G.

After test, equivalent to the effect of expected actual handling and transit, the bundle still looked like this.

Shake well before shipping!

A neat 2,300 pound bundle of aluminum ingots becomes 44 ingots trying desperately to go their separate ways...driven by the joggles and jolts of the vibration tester in the Signode Packaging Laboratory. The ingots hold together, though. They're bound to...by 51 cents worth of steel strapping pulled to about 3,000 pounds tension. We don't know of another material that could do this job at all...let alone at such low cost. And consider the savings of having Signode find out *in advance* and at no cost to you how to make your product behave in transit. This is one more way Signode helps make things cost less to handle, store, ship, and receive. For further information, talk to the Signode man near you, or write:

SIGNODE STEEL STRAPPING CO.

2663 N. Western Avenue, Chicago 47, Illinois

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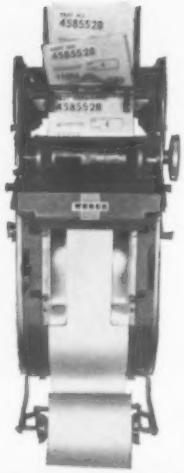
Print your own—as you need them!



Weber Label Printing Machine produces product identification or content labels when, where and as they are required. Cuts costs, eliminates label inventory problems!

No matter what volume or assortment of labels you use—shipping, product identification, carton content, box end, etc. — a portable Weber Label Printing Machine in your office or plant saves money, time and effort. Compact, typewriter size — this fully automatic machine prints, counts, cuts to the size desired, and stacks labels at the rate of 105 per minute.

With a Weber Label Printer you no longer need to buy, store and inventory large quantities of labels. It enables you to print your own as you need them. You get control and complete flexibility—print shipping labels one minute, product identification or packing slips the next. The Weber Label Printer can be adjusted in seconds to satisfy all your requirements for different sizes and varieties of labels for use in shipping, production, packing, inspection or for other departments. Prints from either a stencil or rubber mat on practically any roll stock—gummed, ungummed, linen or pressure sensitive. For more detailed information on the various Weber Label Printers, mail the coupon below.

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LOW-COST MAINTENANCE
Begins on page 172

- Don't crowd air-conditioning equipment. Insure accessibility on all sides for repair or replacement of parts. Thus you also avoid neglect of inspection because equipment is hard to reach.
- Consider corrosion-resistant materials for drip pans under cooling coils of air-conditioning equipment or similar service.
- Consider whether reduced maintenance costs will justify semi-automatic or fully-automatic dust filter equipment as against manually disposable or replaceable filters. When choosing replaceable filters, see that proper filter cleaning facilities are available near by.
- Don't undersize a comfort air-conditioning system or skimp on controls if you want to avoid continual complaints and excessive calls for adjustment by maintenance personnel.

OTHER SERVICES

If facilities are hard to inspect, they can't be properly maintained.

In most plants the bulk of the maintenance labor bill is for upkeep and repair of plant services. Proper selection, arrangement, and installation will cut the number of repair calls. Also will cut repair time—and thus increase worker productivity. How? By minimizing job make-ready and put-away.

- Consider chemical treatment to minimize deposits in piping systems and tankage. For example, chlorination to hinder algae growth.
- Don't skimp on valves in pipe distribution systems. Provide sectionalizing valves so you can isolate piping sections or individual equipment, thus achieving speedy maintenance and minimizing effects of unexpected breakdowns.
- Install special valves to cut maintenance, repair, or alteration downtime, such as drain valves, free blow valves, high-point bleed valves, and tell-tale valves. Also provide stub tees in loops or runs for relay-

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This is a picture of a new product

It's nothing you can use in your plant tomorrow — or even next year. But Allis-Chalmers is working on it *now* to meet the needs of industry in the future.

Fundamental research of materials, processes and equipment is an important part of the A-C contribution to industry. *This enables product design engineers to make existing products even better, to create a continuous flow of new equipment, to help industry achieve new efficiencies and economies.*

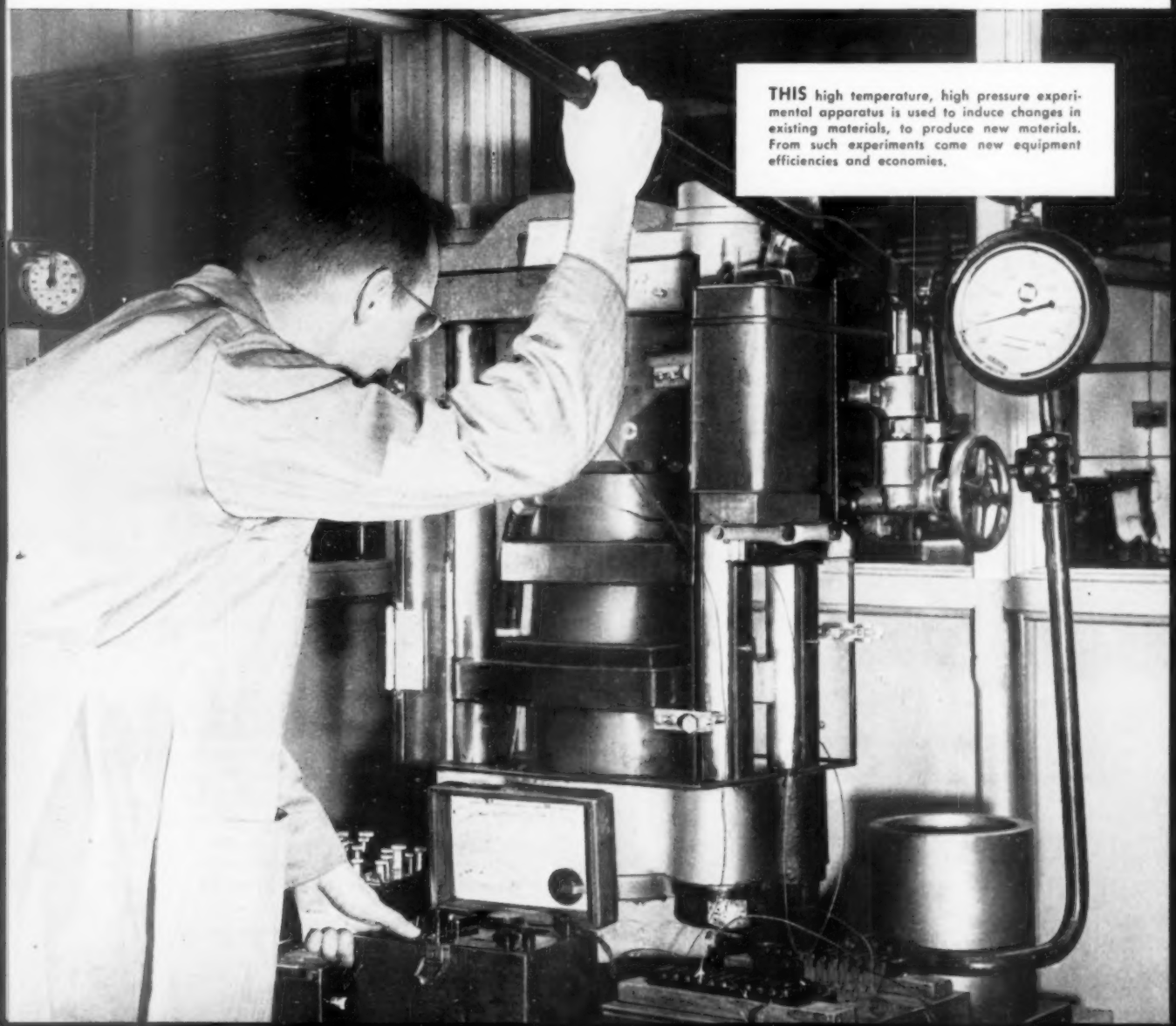
Research and development are only two reasons why A-C is recognized as a leader in supplying both electrical and mechanical equipment for industry. Single-source availability of "teamed" equipment, maximum engineering help and outstanding service facilities are others.

Talk *to your A-C representative or distributor soon about your requirements. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.*

Plan to stay ahead... MODERNIZE!

ALLIS-CHALMERS

A-1004-GI



THIS high temperature, high pressure experimental apparatus is used to induce changes in existing materials, to produce new materials. From such experiments come new equipment efficiencies and economies.

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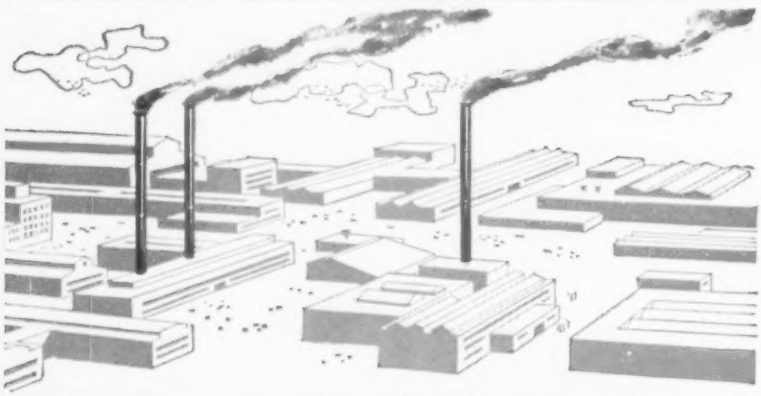

Glass-protected stacks...

Permaglas® smokestacks are glass-protected(inside and out)... are virtually impervious to condensate corrosion

* Accelerated life tests prove that *Permaglas* stacks last 3 to 5 times longer than plain steel stacks

* *Permaglas* stacks are easy to install—no special equipment needed

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Through research ...a better way

A.O.Smith CORPORATION

PERMAGLAS SMOKESTACK SALES
PROCESS EQUIPMENT DIVISION
MILWAUKEE 1, WISCONSIN

A. O. Smith Corporation, Dept. F-49, Milwaukee 1, Wisconsin
Gentlemen: Please send me a copy of the Permaglas Smokestack Bulletin No. SS-202.

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Address_____
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LOW-COST MAINTENANCE

Begins on page 172

outs and future equipment. Don't substitute blind flanges for drain valves on tanks to save money. Cost of labor is greater in frequent removal of such flanges when flushing out or checking out process piping systems at start-up.

• Where only one auxiliary unit of any kind is needed, consider practical and economic feasibility of two smaller units of same total capacity, thus insuring partial service when making routine inspections or emergency repairs. For example, consider two half-capacity pumps so that when one pump is shut down, the other can, under proper conditions, temporarily handle two-thirds of the normal total load.

• Use anti-sweat and thermal insulation materials where prevention of corrosion or freezing will eliminate a more costly repair job. Consider steam or hot-water tracers or electric heating cable.

• Design piping to minimize vibration, water hammer, and shock. Avoid undue stress on equipment, anchors, or hangers. Provide expansion joints, flexible joints, or flexible hose or pipe wherever piping is connected to moving or vibrating equipment. Install expansion joints in pump suction lines, and in discharge lines where piping flexibility won't take care of expansion.

• Consider locating piping and other services near floor level, where feasible, for easier maintenance without scaffold.

• Use protective equipment (such as strainers, filters, sludge pots, magnetic separators, screens, settling basins) to remove harmful foreign bodies from pipelines, equipment, and fluid control systems (air, oil, etc.) In any closed system study possibility of quickly separating abrasive materials after they enter the system. For example, a magnetic separator in a hydraulic system can save many maintenance hours.

• Provide permanent facilities wherever frequent climbing or lifting is involved in maintenance of specific equipment. Install ladders, platforms, and catwalks where frequent overhead servicing is required. Provide safety cages and guard rails; otherwise places hard to get to and unsafe to reach won't get proper

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Cut Fire Hazard

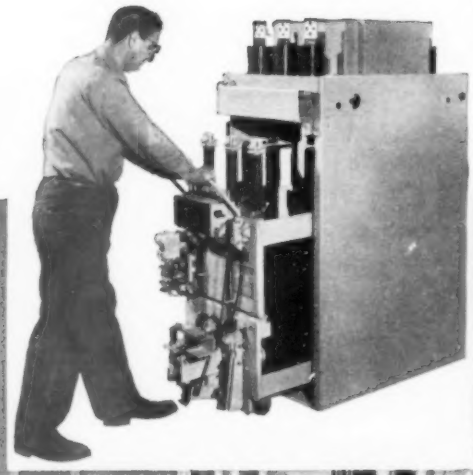
Replace obsolete under-capacity breakers with low cost, high speed 4.16-kv oilless units

In plant after plant, it's possible to eliminate a fire hazard . . . reduce maintenance . . . provide modern high speed interruption . . . plus adequate interrupting and continuous-current capacity with Allis-Chalmers replacement breakers.

Existing cables and structures can be used with these replacement breakers. Low cost modernization can thus be provided in power-generating and substation facilities. The air magnetic breaker, together with its sturdy metal enclosure, can be installed in the masonry cell or open-type iron pipe framework previously occupied by the obsolete oil circuit breaker. Buswork, disconnect switches, current transformers, and cables can all be retained.

Modern features of breaker include: 5-cycle interruption, flame-retardent insulation, safety interlocks, full steel floor in breaker compartment, automatic shutters, one man disassembly. Interrupting capacities from 75,000 to 250,000 kva available.

For details contact your nearby A-C man or write Allis-Chalmers Power Equipment Division, Milwaukee 1, Wisconsin.



ALLIS-CHALMERS

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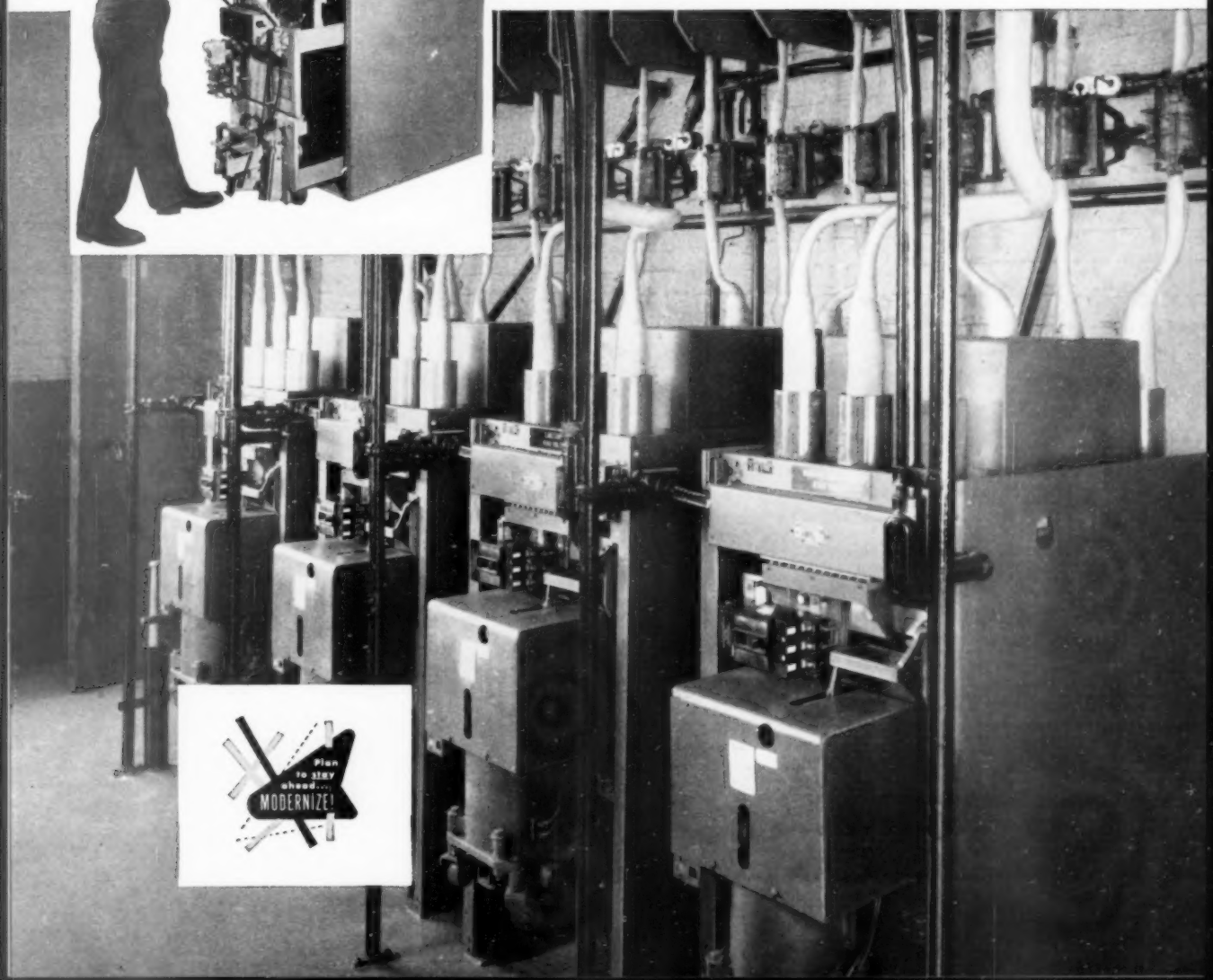


attention. Install a beam or hook for a hoist over heavy electrical equipment if other facilities are not available for lifting.

• Speed maintenance and cleaning of equipment and facilities with convenient outlets for water, vacuum, compressed air, electricity.

• Provide indication or alarm systems for all automatic or critical services to signal malfunctioning or system failure, thus prevent damage and resultant repair costs. For example, for high or low water-tank levels, fuel oil-line temperature, oil pressure on bearings, water-cooling temperatures.

• Don't slow down maintenance worker's productivity by making him worry about hazardous conditions, such as hot piping or energized conductors. Insulate steam and condensate piping that will be exposed to human contact. Don't leave bare wiring where a man has to work.

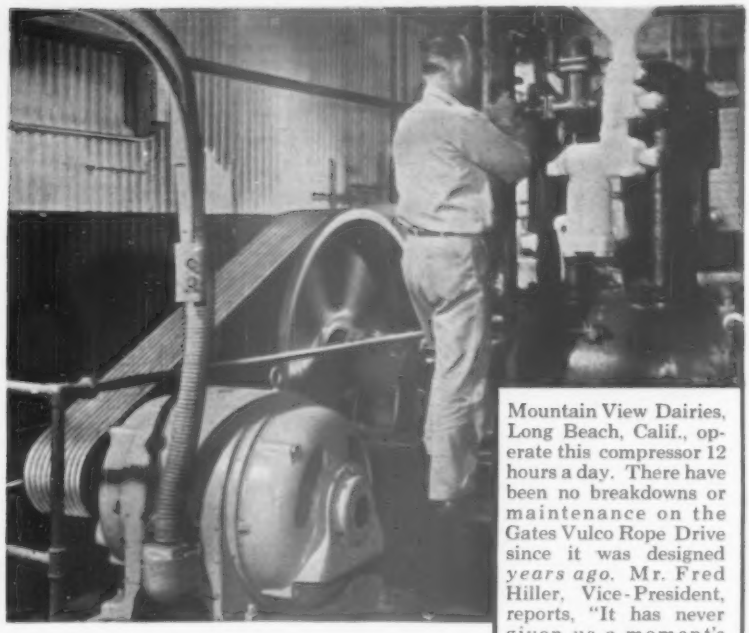
• Where underground piping is subject to damage or crushing from heavy vehicle or materials-handling equipment, consider use of steel pipe that's protected from corrosion by wrapping or other covering.

• Where there is considerable underground steel piping and structure, consider use of cathodic protection to minimize destructive corrosion.

• Consider flexible and rigid plastic piping for corrosive service and long underground runs. But be sure to check specifications against proposed service as to effect of heat, pressure, chemicals and impact. Provide plenty of support and protection from blows for rigid pipe.

• Supply plenty of dirt pockets with drains in all steam lines, especially in all-welded systems, thus provide for proper flushing out before use and periodic cleaning in service. Make pockets large enough to catch all dirt and scale. For drains, use 1¼-in. gate valves to prevent plugging.

• Provide pipelines carrying viscous or sludge fluids with permanent flushing connections to facilitate line clean-up. Also provide test connections, thermowells, and similar indicators to determine location of trouble. If pipeline is of welded construction, insert flanged spools occasionally for easy dismantling in



Mountain View Dairies, Long Beach, Calif., operate this compressor 12 hours a day. There have been no breakdowns or maintenance on the Gates Vulco Rope Drive since it was designed *years ago.* Mr. Fred Hiller, Vice-President, reports, "It has never given us a moment's trouble."

The No. 1 choice of industry everywhere

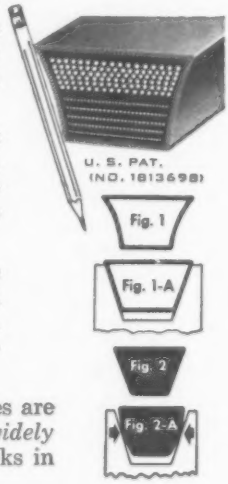
...the V-belt with concave sides

To prove to yourself why concave sides give this V-belt far longer life, make this simple test: bend a Gates V-Belt as if it were going around a sheave. Feel how the concave sides (Fig. 1) *fill out* . . . become perfectly straight (Fig. 1-A).

Note how the belt makes full contact with the sides of a sheave . . . grips evenly, thus distributing wear uniformly along the sides of the belt. Uniform wear lengthens belt life — keeps costs down.

With a straight-sided belt (Fig. 2) the sides *bulge out* when the belt is bent, and wear is concentrated on the bulge (Fig. 2-A). Uneven wear shortens belt life — increases belt costs.

Because Gates V-Belts with concave sides are so universally preferred, they are the *most widely available.* There are Gates Distributor stocks in industrial centers *throughout the world.*



The Gates Rubber Company, Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario
Gates — World's Largest Maker of V-Belts
TPA 392

Gates Vulco Rope Drives

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Allis-Chalmers tackled this motor problem "cold"

Even heavy icing couldn't freeze this motor. An Allis-Chalmers customer required that this open-type *Super-Seal* motor start even though embedded in ice.

Successful tests were conducted in the A-C Motor Laboratories where customers' motor needs point the way to continuous development programs.

Research and testing of this type has established Allis-Chalmers as a pioneer-leader in the motor industry. It has led to the most complete line of integral-horsepower motors; it has led to tremendous acceptance of such A-C developments as *Synduction* and tube-type motors, and now *Super-Seal* motors.

You can benefit from this pioneer-leadership by contacting your A-C representative or distributor, or by writing Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Super-Seal and *Synduction* are Allis-Chalmers trademarks.

Plan to stay ahead... MODERNIZE!

ALLIS-CHALMERS A-C

A-5956-G1

case snaking or rodding is needed to clear stoppages.

- Consider insertion of flow indicators in pipelines, or visible drains, where they will help operator spot trouble before it becomes a maintenance problem. Try a section of glass or clear plastic piping to serve this purpose.
- Allow enough space and clearance around piping and equipment to make maintenance easy.
- When maintenance of any equipment or single component requires shutting or adjustment of remote valves, make sure need for this procedure is tagged onto equipment and that valves involved are coded.
- Consider low maintenance cost of a high-temperature hot-water system for plant and process heating. It has no traps, no condensate returns, and few if any corrosion problems.
- Keep piping, valves, controls, mechanical operators, hangers, and other permanent fixtures out of aisleways and access space, thus avoid traffic damage. Protect watercoolers, time clocks, vending machines, etc., by guardrails or wheel curbs or by spotting them in recessed areas.
- Consider separate compressors for plant air and instrument air. You can cut your instrument troubles by providing instrument airlines with air dryers that will remove all traces of moisture.
- Use through bolts for anchor bolts on heavy equipment foundations to facilitate the replacement of damaged bolts.
- Prepaint those columns, conduits, and pipe sleeves that extend through a concrete floor with a suitable protective coating against rusting. Use moisture stops around such items if they pass through wet floors. Provide skirts around pipes above floor sleeves in areas that have to be regularly hosed.
- In early planning, standardize on plant equipment, such as pumps, instruments, electric motors, thus arrange for a satisfactory inventory of spare parts at low cost—and easier and faster maintenance.
- Locate instruments and panel boards away from areas that are subject to vibration, thus reduce your servicing requirements.
- Check piping layouts and equip-

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From this cubicle comes advance proof of pump performance

This master control room of Allis-Chalmers pump test floor is far removed from actual installations. Yet, engineers working here know exactly what your needs are — and which Allis-Chalmers pump will best do the job.

Suction heads, discharge heads, gpm capacity, required horsepower plus other essentials for satisfactory pumping performance are all proven in advance.

Performance testing like this is only one reason why A-C is recognized as a full-line leader in meeting the pump needs of industry. "Teamed" motors and control; customized standardization of parts and materials; engineering assistance and nation-wide service are others.

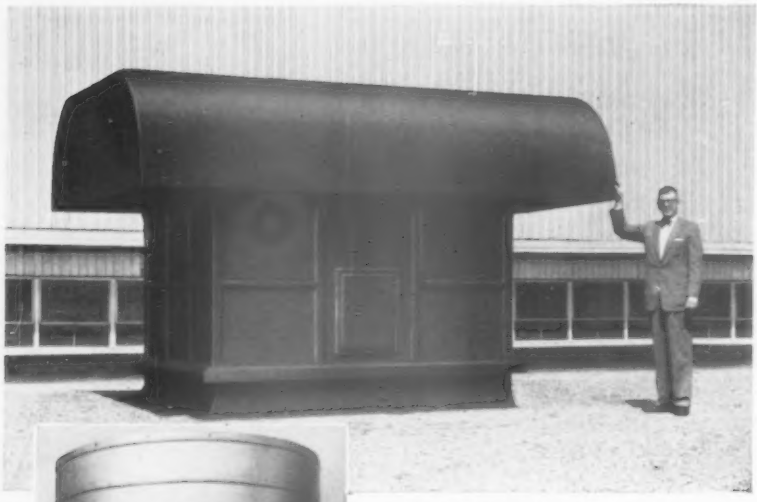
Whatever your requirements in centrifugal pumps — from the smallest to 250,000-gpm giants — contact your A-C representative or distributor. Or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Plan to stay ahead... MODERNIZE!

A-C ALLIS-CHALMERS

A-5981-G1

Typical of A-C pump contributions is this Type SJD pump (double suction, horizontal split-case construction with double volute). It replaces *two pumps* in series to save users as much as $4000 on water-handling applications.



"Buffalo" Style "H" Sky-Vent Power Roof Ventilator.

"Buffalo" Style "V" Sky-Vent Power Roof Ventilator.

ECONOMICAL "BUFFALO" VENTILATING PACKAGES

Your Maintenance Staff Can Easily Install!

Do you need high volume exhaust ventilation for plant areas where duct work would be unduly expensive — or for locations without adjacent outside walls? Ventilation that will not consume valuable production space, or interfere with future plant modifications? Then "Buffalo" Sky-Vent Power Roof Ventilators are your *practical* answer — for these reasons:

- **Economical to Install** — "Buffalo" Sky-Vents are shipped as completely assembled packages, including fan, motor, housing, hood and roof curbing.
- **Economical to Operate** — The high efficiencies of "Buffalo" fans result in the lowest possible operating costs.
- **Economical to Maintain** — Maintenance expense is held to an absolute minimum by "Buffalo's" rugged, rigid, weather-proof construction and 1/8" thick cork impregnated asphalt coating on interior and exterior surfaces.

Dependable, economical, trouble-free "Buffalo" Styles "H" and "V" Sky-Vent Power Roof Ventilators are available with famous "Buffalo" Propeller or Axial Flow Fans in 12" through 120" wheel diameters, to exhaust 1000 to 250,000 CFM of hot air, fumes and fogs. For complete application information, contact your nearby "Buffalo" engineering representative—or write for Bulletin FM-2345.

"Buffalo"

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Buffalo Pumps Division, Buffalo, N. Y.
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INDUSTRIAL EXHAUSTERS • BELTED VENT SETS • PROPELLER FANS • "E" BLOWERS-EXHAUSTERS

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LOW-COST MAINTENANCE

Begins on page 172

ment to see that pipe and conduit don't block the openings through which your equipment must be removed for servicing or overhaul.

- Provide drainage for all pumps to carry away gland leakage, seal water, cooling water, and so on.
- Install a drain in the bottom of any stack and provide an access door or manhole.
- Place drains in all tanks at the very bottom, and slope tank bottoms to these drains by tilt blocks if feasible. Saves time when tank has to be emptied for maintenance.
- Consider welding crane rail joints, to minimize wear and tear on crane wheels and track.
- Design built-in chutes for easy replacement of wearing surfaces.
- Bolt rather than weld sheetmetal connections that have to take severe shock or vibrating loads. You'll probably end up that way anyhow. But use fasteners that won't loosen.
- Keep maintenance in mind when you arrange layout of permanent equipment. Straight-line layout, for example, makes it easier to move machinery and parts in routine and emergency operations.
- Double up use of pipe handrail along conveyor walkways so it will serve also as compressed-air line for cleaning and power-tool operations. And when you use pipe as outdoor fence rail, you can also use it for yard lighting or lawn sprinkling.
- Provide permanent platforms with ladders for servicing overhead control valves.
- Install chains or extension on overhead valves that require frequent resetting.
- Set up records and scale drawings of location of utility lines. Consider a file of photographic construction progress records, especially of complicated underground piping.
- Study pipelines for possible corrosion, abrasion, or other forms of wear and tear, with a view to selecting materials that will give most economical service.
- Provide housing over outdoor belt conveyors to prevent damage to belting from ice and sleet.
- Consider providing equipment for filtering or reconditioning lubricants in a closed system to cut bearing wear.

END

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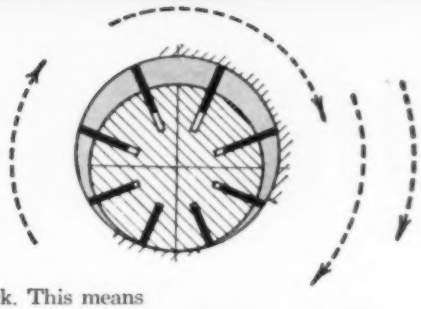
Smooth and Tough



Rotary motion cuts vibration — eliminates shock. This means savings in maintenance and installation. That's why the story of the *Ro-Flo* compressor is important to you.

They're being used successfully on hundreds of applications including: air hoists, lifts, pneumatic tools, sandblasting, blowing castings, and air chucks.

Another advantage is constant efficiency. The fall-off in efficiency, inevitable with other units, never takes place with a *Ro-Flo* compressor.

For smoothness, for toughness, for simplest installation and easy maintenance, choose the *Ro-Flo* compressor.

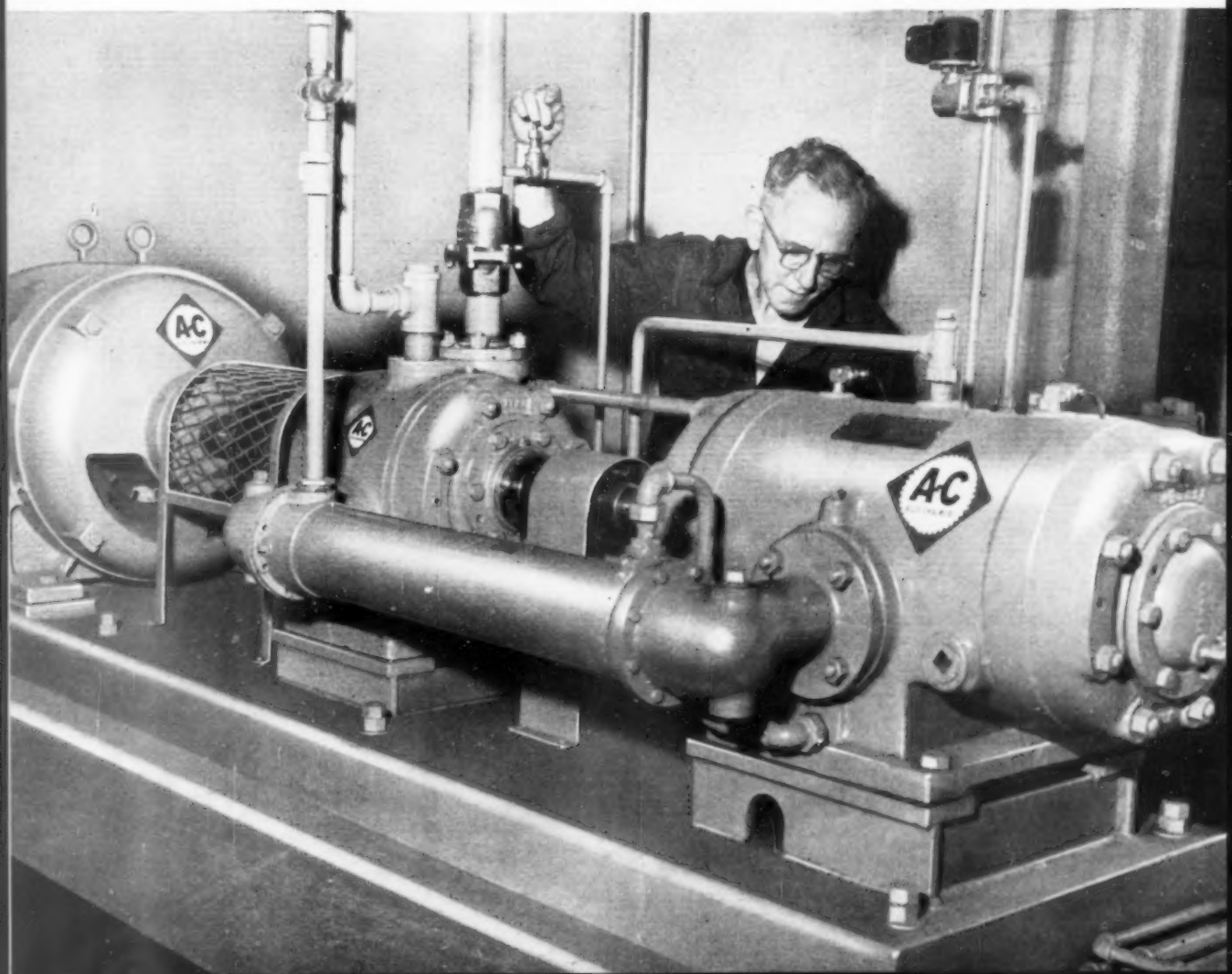
Get bulletins 16B8244 and 16B8126. Call your nearby A-C office or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

Ro-Flo is an Allis-Chalmers trademark.

Ratings: Pressures to 125 pounds gauge. Volumes 40 to 3000 cfm.

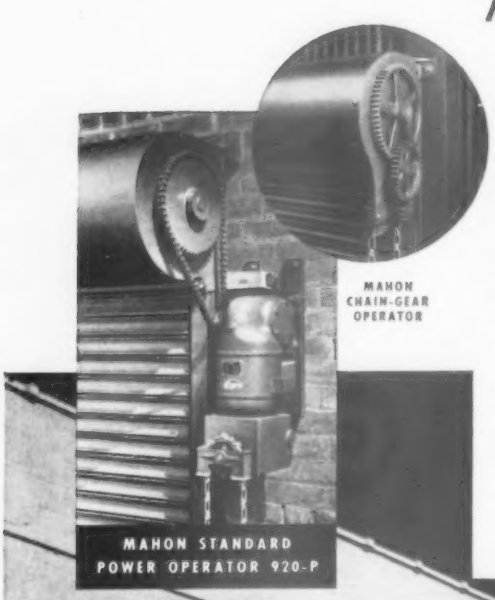
ALLIS-CHALMERS

A-5960-G1



Rolling Steel Doors

Manually, Mechanically, or Electrically Operated



Whether it be a truck opening, shipping dock opening, railroad opening or crane opening, in new construction or in an old building, rolling steel doors offer very definite timesaving and space saving advantages . . . the fast, vertical roll-up action of the door curtain requires no usable space either inside or outside of the opening—and there are no overhead tracks or other obstructions to restrict headroom and interfere with material handling or stacking adjacent to the opening. In addition, the all-metal construction of Mahon Rolling Steel Doors give you the permanence of Bonderite protected steel . . . maintenance is minimal, and, in steel, you also get maximum protection against intrusion and fire. No other type of door can provide all of these important features which are so necessary for functional efficiency in door openings today. When you select a rolling steel door, check specifications carefully . . . you'll find, through comparison, that Mahon Rolling Steel Doors are built better to give you better service over a longer period of time. See Sweet's Files for complete information, including specifications, or write for Mahon Catalogue G-59.

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Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Metalclad Fire Walls, Insulated Metal Curtain Walls, Electrified M-Floors, Acoustical and Troffer Forms, Acoustical Metal Ceilings, Steel Roof Decks, and Long Span M-Decks.

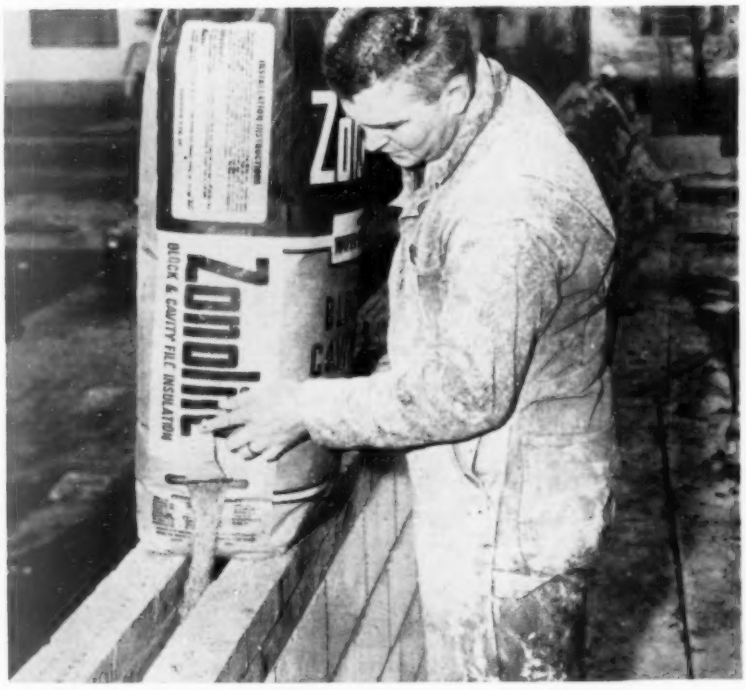
ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

The illustration above shows four Mahon Power Operated Rolling Steel Doors, 18 Ft. x 14 Ft., installed in a new addition to the plant of Remke, Inc., Roseville, Michigan, Builders of Commercial Truck Bodies and Trailers.

MAHON

For more facts Circle 555 on Reader Service Card

For more about these items, circle numbers on Reader Service Card next to back cover.



Mineral Fill Keeps Masonry Dry

Water-repellent masonry fill insulation is a free-flowing mineral (vermiculite) that eliminates moisture and condensation in block and cavity wall construction.

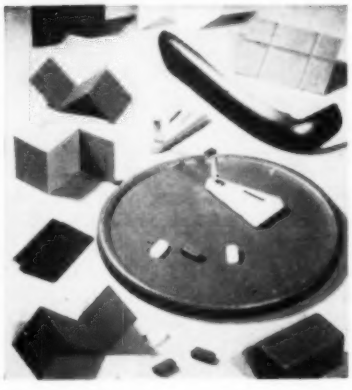
Zonolite fill insulates permanently. Repels water even after long exposure. Remains free-flowing, will not cake or ball after water is poured through it. It's lightweight and easy to handle—can be poured into wall cavity either from bag or from a hopper that slides along the top of a wall as insulation is applied. Maker says two workers can insulate up to 1000 feet of wall space in about 40 minutes.

Zonolite Co. (Circle 251).

Rugged Steel Sheet

Plastic coated steel sheet is strong and versatile, with applications ranging from railroad cars to picnic coolers. The plastic on steel involves curing and bonding of liquid vinyl plastisols to either cold rolled or galvanized sheets and coils. Before cooling, coating is embossed with any texture that can be engraved on a printing roll. In colors, 18 through 28 gages, 24- to 52-in. widths, 30- to 144-in. lengths.

U. S. Steel Corp. (Circle 252).



253—Spray Booth Release Lining is a near-permanent material that saves clean-up time. Fluorocarbon coated glass fabric is bonded to both sides with cement. Paint adheres so loosely it can be peeled off without stripping lacquer. *E. I. duPont de Nemours & Co., Inc.*

254—Leak Detector finds leaks in compressed air lines pronto. You just have to wipe joint with dauber and if bubbles appear in five seconds, there's a leak. It applies as clear liquid. No mixing is necessary; the material lasts indefinitely. *Sprague Devices, Inc.*

New Tumbling Shape

This tumbling media for barrel finishing is a truncated triangular pyramid with sharp edges and acute angles. The new-shaped media is said to work into radii not reached by other types. Composed of aluminum oxide mineral anchored in a binder, it is not affected by acids or alkalis normally found in finishing compounds. In addition to faster cutting, media eliminates discoloration, impingement, and media fracture. New shape is lighter in weight than others. Since this media is purchased by the pound, it should prove economical to users.

Minnesota Mining & Mfg. Co. (Circle 255).

Turn the page

For more about these items, circle numbers on Reader Service Card next to back cover.

256—Fibrous Silicone Rubber, Cohrlastic FSR, is a mat of silicone rubber fibers oriented in a random way. This results in a product with tensile and tear strength—and permeability—that's said to be bettter than silicone sponge and foam. *The Connecticut Hard Rubber Co.*

257—Liquid Aluminum, called Devcon F-2, can be cast without heat or pressure. Material becomes liquid on addition of hardening agent, then after two hours is a tough durable metallic mass. Can be drilled, tapped, or otherwise machined. *Devcon Corp.*

258—Corrosion-Resistant Coating is said to be toughest surface coating ever developed for plant floors and walls. Called Penntrowel, it's for the repair and protection of concrete and other sub-surfaces. Seals out moisture and hardens quickly. *Pennsalt Chemicals Corp.*

259—Molding Latex is a new self-vulcanizing liquid molding compound that's water soluble. When exposed to air at room temperature the liquid evaporates to form a light amber gum rubber mold that will not chip, crack, or lose detail. *Adhesive Products Corp.*

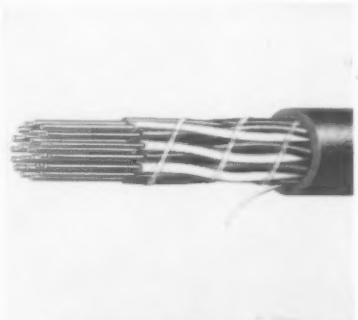
260—Spun Glass Material offers many advantages in roof repair, reconditioning, or replacement. Tropiglas is made of spun glass threads, criss-crossed at random to make tough glass mat. Lies flat, is lightweight; can be used to form flashings. *Tropical Paint Co.*

261—Oriented Nylon Strip is used as component in manufacture of power transmission and conveyor belts. Laminated with leather or rubber, Reevestrip gives strength and flexibility to the belt. Leather or rubber on outside provides grip. *Reeves Bros., Inc.*

262—Dry Mixture that pickles all base metals and strips chromium is called Pickelene 300. It produces a bright, smut-free surface and gives off no objectionable fumes. Mix includes acid salts, activators, and surface active agents. *Hanson-Van Winkle-Munning Co.*

263—Joint 'n' Crack Sealer is a new flexible mastic water-stop. Made from synthesized rubber compounds and long fiber asbestos, it does not sag or run under hot sun. Retains bonding action to joint or crack through continuous thawing and freezing. *Kle'e Waterproofing Corp.*

264—Mastic Adhesive, Bondmaster G459, is non-flammable. Will bond "Styrofoam," "Dylite," and similar expanded polystyrene foams to themselves and to other materials. It can also be used for bonding insulating and sound-deadening materials. *Rubber & Asbsetos Corp.*



265—Intercommunication Cable, size No. 22 Awg, comes in color-coded copper conductor pairs of 6, 11, 16, 26, and 51. Over-all jacket is insulated with Flamenol (polyvinyl chloride), as are the paired conductors, to make color coding permanent. *General Electric Co.*

MATERIALS LITERATURE

266—Structural Panels, Grids. This 12-page catalog (No. 3A) describes three types of materials and their applications for low, medium, and high rise structures, and multi-story buildings. Specs, photos. *Albro Metal Products Corp.*

267—Anti-Abrasive Alloys. "The Role of Molybdenum in Abrasion Resistant Materials" is a 36-pager. Lists alloys that resist gouging, grinding, scratching. Tells how to produce abrasion-resistant parts. *Climax Molybdenum Co.*

268—Plastic Piping Systems. What plastics to use, installation and coupling methods are discussed in 16-page handbook (C-159). Gives standards for plastic pipe, chemical resistance and physical properties charts. *Chemtrol.*

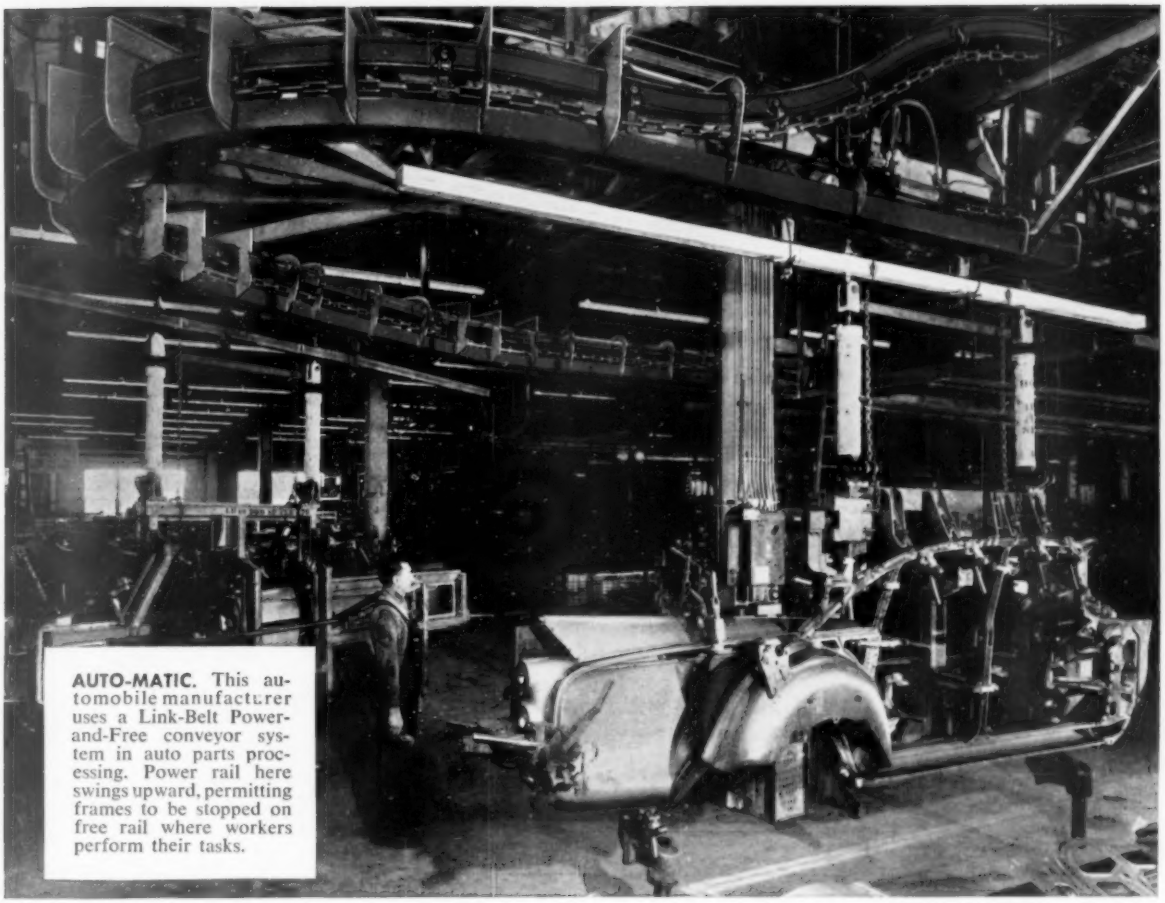
269—Aluminum Mill Products. Here's a 12-pager (GI-4) with characteristics and properties of sheet, plate, foil, rod, bar, wire, other products. Compares non-heat and heat-treatable wrought alloys. *Kaiser Aluminum & Chemical Sales, Inc.*

270—Pipe, Equipment Insulation. Specs covering heated indoor and outdoor applications of Kaylo insulation are given in illustrated 8-page catalog (1-IN-759). Resists temperatures up to 1800 F. *Owens-Corning Fiberglas Corp.*

271—Polyurethane Elastomer. This solid synthetic is discussed in 24-page booklet. It's said to replace metal, ceramics, rubber for many uses. Lists chemical, electrical, thermal, other data. Photos. *Disogrin Industries, Inc.*

272—Aluminum Casting Alloy. Design specifications, mechanical properties, and casting technique are covered in illustrated 12-page bulletin (NAV20-1). Material is said to save 25% to 40% in weight of parts. *Navan Products, Inc.*

Stop-and-go handling for non-stop production



AUTO-MATIC. This automobile manufacturer uses a Link-Belt Power-and-Free conveyor system in auto parts processing. Power rail here swings upward, permitting frames to be stopped on free rail where workers perform their tasks.

Link-Belt Power-and-Free conveyors provide routing, storage, recirculation

MATERIALS handling flexibility to its highest degree! Link-Belt Power-and-Free trolley conveyors make straight-line production possible even where materials are processed at varying speeds. They'll transport parts to work areas, leave them there to be processed. They'll reclaim material from storage as needed. Cargo can be slowed down, speeded up or stopped . . . moved vertically, pivoted, indexed, dumped or dipped as needs dictate.

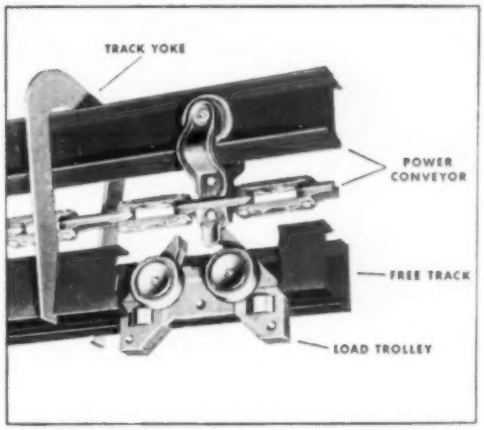
To learn more, call your nearest Link-Belt office or write for Book 2330.

15,118

LINK-BELT

TROLLEY CONVEYORS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.



HOW IT WORKS. Propelled by power conveyor, material rides smoothly on free track below. At work station or storage area, load carriers are switched to or from unpowered free tracks which can be located on either or both sides of the main Power-and-Free conveyor.

For more facts Circle 556 on Reader Service Card

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WITH A DEVILBISS PAINT HEATER

DEVILBISS HOT-WATER PRINCIPLE

Diagram shows how the DeVilbiss hot-spray method uses water as a temperature equalizer. The heating action of forced hot-water circulation is fast, yet gentle and safe. Uniform paint temperatures are maintained without "hot spots" or the danger of thermal override. Paint can never be overheated to cause scorching, hardening, or discoloration.

Circulating hot water heats paint gently, quickly, and keeps it hot all the way to the gun

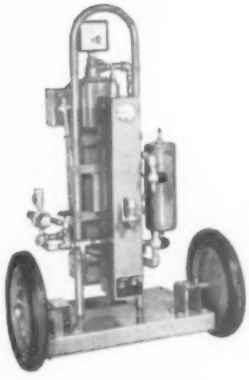
Paints, like certain foods, scorch quickly—can't stand an intense, direct-heat.

The DeVilbiss Paint Heater with its water jacket, like your double boiler, is the only method that applies a gentle heat to eliminate "hot spots." There is no possibility of overheating or hardening paint, because the water serves as a temperature equalizer between the heat source and the paint.

An exclusive heat-jacketed hose, with circulating hot water, maintains the proper temperature of the paint right up to the spray gun.

Only water is recirculated in a DeVilbiss system—there is no need for repeated circulation of paint in order to reheat it.

For hot spray at its best, check the yellow pages of the phone book for your DeVilbiss representative and ask for a demonstration of the DeVilbiss Paint Heater—the safe, sure way to improve painting quality, reduce overspray, apply heavier coats, and make the job of application easier.

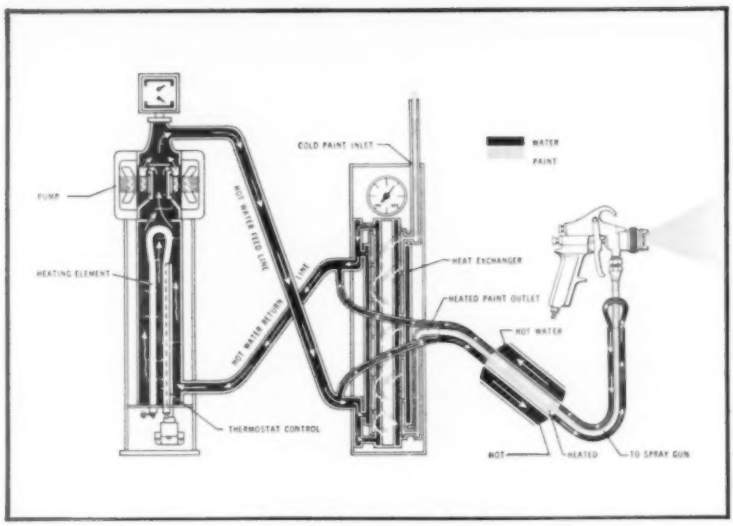


DeVilbiss Portable Paint Heater lets you take hot spray to the job. Hooks into any conventional spray outfit. Units for production-line installation also available.

YOU CAN'T SCORCH PAINT!

DIRECT-HEAT PRINCIPLE

Exposing paint directly to the metal heating medium—as shown in diagram representing ordinary paint heaters—results in higher temperatures at the point of heat transfer. And although the heating element may be thermostatically controlled, when the paint stops circulating, thermal override often causes scorched, hardened or discolored material.



Water is heated in compact electric unit (left), and circulated through heat exchanger (center). Paint rapidly reaches a controlled temperature in the exchanger, as it spirals through a passage surrounded by hot water. Water-jacketed hose (right) keeps the paint hot as it flows up to the gun.

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HOSE AND CONNECTIONS • MIST COOLANT UNITS

By PAUL A. KING, Attorney, Bigelow-Sanford Carpet Company, Inc.; Member, New York Bar

Need a Guideline for Your Side Agreements?

How valid is a side agreement if the parent union fails to sign? Plenty valid, says this arbitrator. Failure to honor in such a case has no legal basis.

Has this ever happened to you? The union signs the contract. So do you. Ten days later the union decides it wants out from under a particular clause. Never intended it to work that way, it argues. Just where does that leave you?

The Cramer-Posture Chair Company of Kansas City found out. Here's its story. The union contract was signed, sealed, and delivered. Then the parties entered into a side agreement that professed to allow maintenance men to do overtime work usually performed by lift-truck operators. Later on, when the company enforced the side agreement the union protested. It didn't mean just that, it argued. It had something else in mind when it agreed to the clause. In fact, the union representative said he had read the agreement in haste and had signed it under a misconception. Besides, the union protested, the side agreement was inoperative. It was not signed by the international.

Shop-wise Arbitrator Marion Beatty was not taken in. He taught the union a lesson in contract signing—in words you may wish to quote to your gang:

"In the absence of fraud or mutual mistake, courts of law will not even hear oral evidence that contradicts written agreements. There is a sound reason, because to allow parties to attack their own written agreements thusly, renders them unstable, unreliable, and of little value. Unless we are willing to allow agreements to be not worth the paper they are written on, I will have to treat the written side agreement as pretty strong evidence of what it clearly says."

What about the agreement not having been signed by the international? On this Beatty reasoned: "Where the parent union is the only union signing the working agreement, may the local negotiating and grievance committee bind the union to such modifications, changes, or amendment? The answer is usually no, for they usually are not the agents of the parent union for that purpose and this, as a rule, is understood by management. To hold otherwise would mean that substantial rights of the working agreement would be whittled away without approval or knowledge of the proper union officers and proper agent."

In this case, however, continued Beatty: "The side agreement . . . was negotiated by the proper agents of the company and the parent union. The company had dealt with the same parties in like circumstances before and both unions (that is, the parent also) had allowed these same persons ostensible authority to act for them in such matters." Here the lack of a signature by a representative of the parent union was not important.

Summarizing his lesson in contract law, Beatty pointed out: "A contract comes into being with a meeting of the minds. Writing and signatures are aids in preventing misunderstandings resulting from faulty memories. There is no law or other requirement that agreements such as these must actually be signed. The fact that the proper representatives of the bargaining union actually entered into the agreement and that it was consummated is what should control, unless it was understood that the agreement was tentative until approved more formally. There is no evidence here of any understanding that the side agreement would be tentative. On the contrary, the evidence is that it was completed and closed in the identical manner in which five other such side agreements had been handled in the prior year."

Fair Rate Changes

Machine speed-up gives company the right to change incentive rates.

One incentive plan (L-O-F Glass Company, Toledo) yielded employees a 25% incentive. The plan was frozen at this level unless there was a change in operation or method. This was the agreement. But when machine speeds were increased, the company upped its production standards. No dice, screamed the union.

Arbitrator Donald A. Crawford rolled them anyhow and turned up a win for the company. Said he, the union-management agreement was to guard against arbitrary changes by the company. Nothing arbitrary here. Machine speeds were jacked up because of machine and engineering changes.

Illegal Union Dues Returned

The U. S. 10th Circuit Court of Appeals has upheld an NLRB ruling requiring a company and a union to pay back union dues and initiation fees collected under an illegal union-security contract.

Clyde F. Waers, regional officer of the National Labor Relations Board, predicted the decision would have a widespread effect among building trade unions which have refused to do away with "hiring halls" and closed shops although these have been illegal since the Taft-Hartley Act was adopted in 1947.

The decision was the first by an appellate court on the NLRB doctrine requiring company and union to

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Save 2/3 of Every Hour of Scrubbing Time

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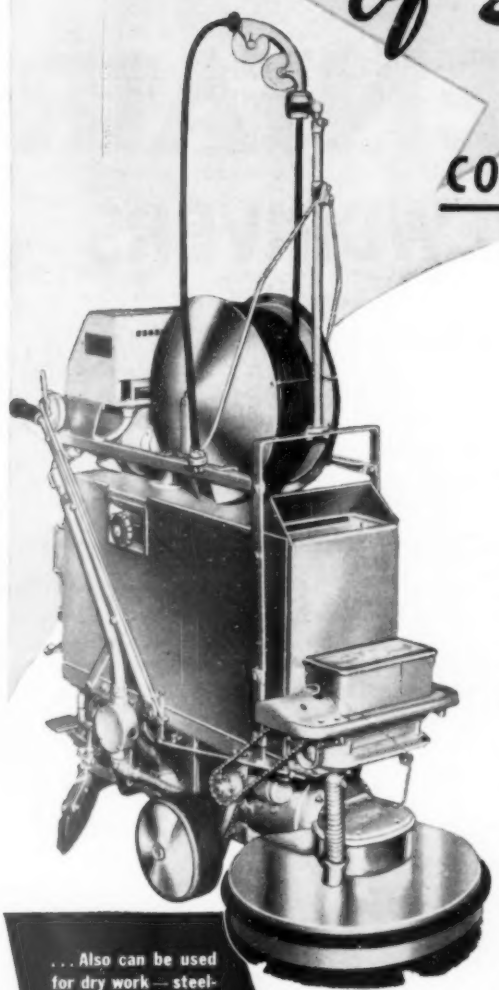

...Also can be used for dry work—steel-wooling, et cetera

(Powder Dispenser is an accessory)

Today, even buildings with but 2,000 to 15,000 sq. ft. of floor space can reap the labor-saving, cost-reducing benefits of *combination-machine-scrubbing.* Here's a *Combination Scrubber-Vac, Finnell's 418P* at left, that's specially designed for such buildings. This *electric* unit, with its 18-inch brush spread, cleans floors in *approximately one-third the time* required with a conventional 18-inch machine and separate vac.

The *418P* applies the cleanser, scrubs, and picks up (damp-dries the floor)—*all in one operation!* Maintenance men like the convenience of working with this single unit... the thoroughness with which it cleans... and the features that make the machine simple to operate. It's *self-propelled,* and has a *positive* clutch. There are no switches to set for *fast* or *slow*—slight pressure of the hand on clutch lever adjusts speed to desired rate. The powerful vac performs quietly. Compactly built, the *418P* also serves advantageously in larger buildings for the care of floors in narrow aisles and congested areas, and is available on lease or purchase plan.

Finnell makes *Scrubber-Vac Machines* for small, vast, and intermediate operations, and in *gasoline* or *propane powered* as well as *electric* models. From this complete line, you can choose the size and model that's exactly right for *your* job (no need to *over-buy* or *under-buy*). It's also good to know that *a Finnell Floor Specialist and Engineer is nearby* to help train your maintenance operators in the proper use of the machine and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2504 East Street, Elkhart, Indiana. Branch Offices in all principal cities ot the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

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Thor discovers how to muffle air motor noise

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YES, here is 75% less noise on your production line . . . the great new Thor "Silentair" Screwdrivers! A steel sleeve with 24 perforations is attached over the exhaust of any of these Thor No. 2 series straight screwdrivers. This sleeve, with its acoustical pattern of holes, breaks up and absorbs the sound of the air motor.

Hear the difference between standard air driven screwdrivers and Thor's new "Silentair." Try one. Then try the other. Then you'll know what silent air power can mean in your plant.

"Silentair" is optional equipment on Thor air screwdrivers—the most powerful available to industry. For a demonstration, contact your nearest Thor factory branch listed below, or write Thor Power Tool Company, Aurora, Illinois.

Quiet power on your lines lets employees do better work, improves output—fewer mishaps, mistakes.

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pay back any union dues or fees collected under an illegal union-security clause.

The NLRB had ordered the Broderick Wood Products Company of Denver and Teamsters Local 13 to refund dues and fees collected from employees since June 1955. The NLRB had found the company and union guilty of unfair labor practices. It held illegal a provision in the Teamsters-company contract requiring that preference in hiring new employees be given union members. The NLRB cancelled the contract and then had to appeal to the circuit court to enforce its decision.

Dues Check-Off

If the Wolf Bakery case stands up, expect the union to come a-knocking on your door for a new dues check-off clause.

Union leaders and their lawyers are upset by the Wolf Bakery case which proved that the National Labor Relations Board meant it when it said that a contract that didn't conform to the Taft-Hartley Act's Section 302 was not a bar to a representation election inspired by a rival union. According to the Board, under Section 302 a check-off clause must have a cut-off date on authorizations. If it also has language calling for the check-off of initiation fees as well as dues, it's a bad clause. The clause in the Wolf Bakery contract was bad on both counts.

Attorneys for the Bakery and Confectionery Workers, the union involved in this case, pleaded for another hearing. Told the Board that if the ruling in the Wolf case were not reversed, over 80% of the nation's union contracts would no longer act as bars. Reason: They don't meet the exacting requirements just laid down by the Board.

Election Rule: Truth Only

A court teaches the difference between truth and propaganda in union pre-election statements.

"There cannot be 'virtually' the truth any more than there can be 'virtually' a virgin," pontificated the Circuit Court of Appeals in Chicago when it drew a line between union pre-election propaganda and barefaced lies in the Allis-Chalmers case.

On election eve, A-C listed for its designers and draftsmen the benefits it had voluntarily given its salaried workers. Seeking the last word on the subject, on election morning the union circulated a letter claiming that the benefits were negotiated for production workers by the UAW, passed out to salaried workers as "scraps from the bargaining table." Foul, cried A-C, at least as to the ninth benefit which appeared on the union listing—"education opportunities through college tuition refund plan." But too late. The union won the election by two votes. The company filed its objection to the election. The union's statements were false, it claimed.

The Regional director of the National Labor Rela-

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Begins on page 196

tions Board saw it all as campaign propaganda: "No campaign trickery was involved here . . . The employees were entirely competent to evaluate the statements complained of . . . The challenged statements did not exceed permissible campaign propaganda and did not prevent the employees from exercising a free choice in the election." He did concede, however, that the statement as to the ninth benefit was false. And in the other eight listed benefits, there were slight inaccuracies.

In the eyes of the strait-laced court to which the case was appealed: "If truth is diluted, it is no longer truth. A glass of pure water is no longer pure if a one-ninth part thereof is contaminated." It ruled: "The deviation from truth in this case is substantial and significant especially when considered in its possible effect upon the election, where any one vote, if it had been cast against the union instead of for it, would have changed the result of the election."

Insurance Is Not Arbitrable

If other arbitrators see it the same way as this one, there's a big advantage to saying nothing about insurance benefits in the union contract.

Utility Steel Foundry and its employees shared the cost of insurance benefits on approximately a 50-50 basis. In 1957, higher medical costs shaped up this problem for the company: Increase its contribution or the employees' contribution (or both), or reduce benefits. The union turned a deaf ear when the company outlined the problem. But when the company reduced the benefits to what the current contributions would buy, the union suddenly began to "hear" things. It heard enough to file a grievance, and argue on the following counts before Arbitrator Paul Prasow:

- The unilateral cut in benefits violated the bargaining requirements of the Taft-Hartley law.
- It violated the contract's recognition clause.
- The employee-distributed insurance booklet outlining benefits said that "The entire balance of the cost is paid by your employer."

It's not arbitrable, proclaimed Prasow. Only differences about the meaning and application of the contract are arbitrable according to the contract. And the contract says nothing about the insurance plan. As to the Taft-Hartley Act and the recognition clause requirement to bargain, the contract contained a waiver of any duty to bargain about insurance during the life of the agreement.

Straight Talk for Strikers

Say the wrong thing to your pickets and you may turn an economic strike into an unfair labor practices strike. Still, you may want to run that risk in order to coax them back into the plant.

How far are you permitted to go in wooing your employees back to their benches? Pretty far if your solici-

Turn to page 204

For more facts Circle 563 on Reader Service Card ➤

Are your $2/hr. men waiting for 30¢/hr. equipment?

It actually may cost *you* less than 30¢ an hour to own and operate a Clark Powrworker*. In arriving at our figure we included such "extras" as cost of charging equipment, 6% interest on the money you have invested in the equipment, an additional 2% interest as a miscellaneous expense, even the cost of current to recharge batteries. This was all over and above the normal charges of: cost of truck, depreciation, insurance, taxes, and freight.

But even at this "high" figure of 30¢ per hour . . . can you afford to keep manpower waiting for lack of sufficient equipment? In pure economics, it makes good sense to give your men the trucks they need . . . especially since it costs so little to own and operate a Clark Powrworker. Possibly, our headline should have read: "*Give every man his own truck!*" Startling? True. But we can show you figures to prove that this bold action is highly profitable.

Surely worth investigating. Send for the 16-page Powrworker booklet. We'll include the name and phone of a local representative who can review our figures with you in detail. Write or wire: Powrworker, Clark Equipment Company, Battle Creek, Michigan.

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Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

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Can any truck really work two full shifts in succession, moving heavy loads, even up ramps? The one shown above has been doing it successfully for over a year . . . since being equipped with one of the new, more powerful Exide-Ironclad Batteries.

The truck is used to move heavy loads of wood at the State Box Company, Sacramento, Calif. It was purchased originally to work one shift, entirely indoors. But increased production called the truck into service outdoors too. This meant moving up and down ramps such as you see in the picture.

The original battery had a capacity of 500 ampere-hours and fitted into the compartment with room to spare. This was plenty of power for one shift operation, but not enough for the two shifts frequently required during rush seasons.

The new Exide-Ironclad Battery packs 936 ampere-hours and still fits into the same compartment. These more powerful batteries are available in sizes for every electric industrial truck. You get more work capacity . . . more power per dollar.

For more details on the new Exide-Ironclad Batteries, write for a copy of the 8-page, illustrated brochure #6230.

50 years . . . never matched. Exide first patented the tubular positive plate battery in 1909. Today Exide-Ironclad is still unmatched for power, life and economy. Improvement has been constant. And now new materials and construction advances put it farther ahead than ever.

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You actually get more charging capacity for the price in these vertical chargers now offered by Exide. Simplified, standardized construction reduces the cost of components, and savings are passed on to you. You also save on upkeep. Clean cooling air is drawn in at the top. So there's less dirt accumulation. Oversize bearings last far longer. In addition, the vertical design saves two-thirds of the floor or shelf space needed for mounting. Write for the new brochure giving complete information.

Exide®

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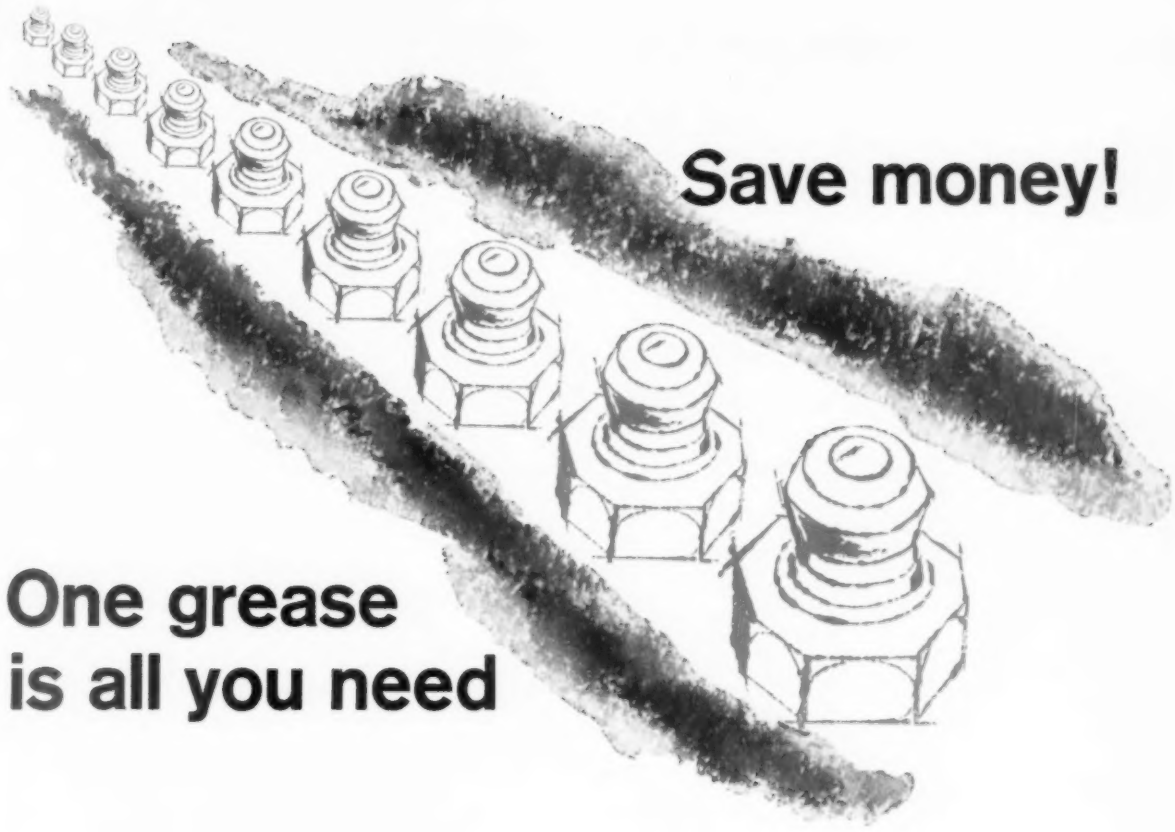

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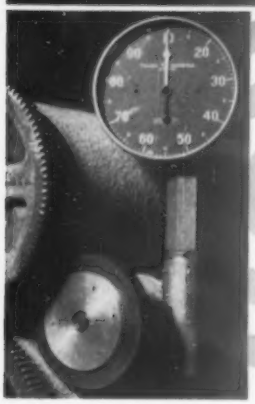

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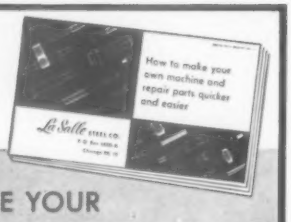

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Begins on page 196

tation does not constitute an integral part of a pattern of illegal opposition to the purposes of the National Labor Relations Act. Or if it is conducted under circumstances and in a manner that is not calculated to undermine the strikers' collective bargaining representative. And if you do not seek individual rather than collective bargaining.

To illustrate, American Steel and Pump Corporation employees were on strike at Webb City, Mo. It sent a letter to all employees saying that the plant was open for all who wanted to work and that it was planning to replace those who didn't return. It concluded the letter with an expression of its amazement that employees wouldn't return when to do so meant they'd be getting 20% more pay than they had been receiving. (This was to be the result of an incentive system the company had offered and was prepared to put into effect.) The general manager followed up the letter by asking the pickets to come to work the next morning and let the company and the committee try to work things out. The assistant general manager explained the new incentive system to two workers, how they'd get more money under it, and perhaps greater seniority to boot if other workers with greater seniority didn't return. All of this was okay, ruled the NLRB.

No Funds for Illegal Strikers

One company withheld funds from the union's welfare fund, claiming they offset damages incurred during illegal strikes.

Possession never was nine points of the law, but when it's money that is possessed, it can give you a comfortable bargaining position. And when dealing with a union, money may be better than having nine points of the law on your side. Here's one case that illustrates this point:

A coal-mine operator contended that the United Mine Workers (the international) had breached the union's contracts as well as the Taft-Hartley law by causing a series of strikes. Under these same contracts, the company was also obligated to pay royalties to the union's welfare fund, based on the amount of coal mined. When the company fell behind in its payments, the fund trustees sued the company for the amounts still owing. There are no amounts owing, claimed the company, when you offset the damages it had incurred from the unlawful strikes.

Here, then, is the big legal question: Is offset permissible? It certainly is, ruled the United States Court of Appeals for the Sixth Circuit. The court's reasoning went something like this. The trustees were suing as third-party beneficiaries of the contract. The company's obligation to make fund payments stems from the contract. The company's obligation is contingent upon the union's living up to its obligations under that contract.

But note this: Any damages claimed against employees who are union members because of their unauthorized acts can't be offset. There must be a claim against the union itself.

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TURN

TYPHOON

Adaptability of Typhoon air conditioning units is shown in this ingenious flush-mounting of units at the existing windows, thus eliminating expensive duct work in the main plant of the Indiana Gear Co. in Indianapolis. 176 tons of Typhoon waterless air-cooled equipment were installed.

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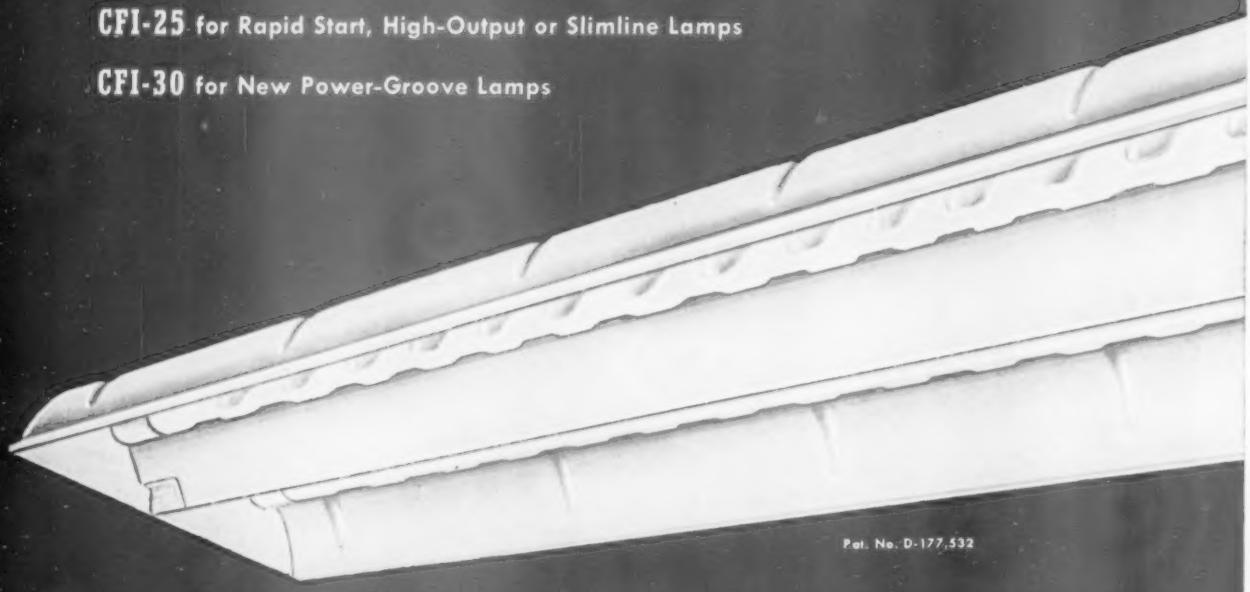


Day-Brite announces "OPERATION UPLIGHT"

IN 1952—Day-Brite introduced Comfort For Industry with CFI lighting fixtures having slotted reflectors.

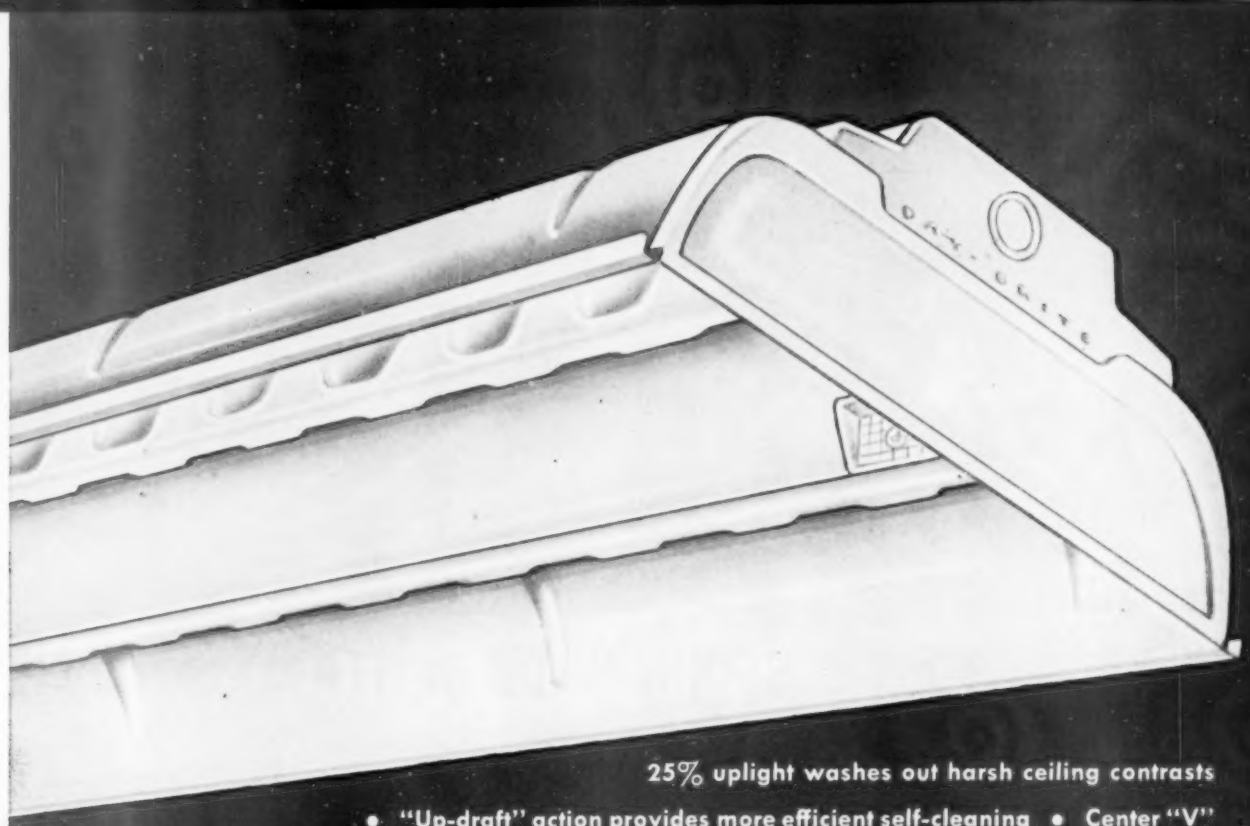
IN 1955—Day-Brite lowered installed costs for quality industrial lighting with improved CFI equipment.

TODAY—tests prove that industrial fixtures having 25% upward components and greater shielding provide *more light* . . . with *greater eye comfort* . . . at *lowest installed and total owning cost* . . . for *all* industrial lighting applications. OPERATION UPLIGHT is the result of these findings.

DAY-BRITE OPERATION UPLIGHT

With OPERATION UPLIGHT, Day-Brite has now standardized its production of industrial fixtures on a basic, high uplighting design. Production savings are being passed along to buyers in PRICE REDUCTIONS AMOUNTING UP TO 17.7%.

Now one basic fixture, available in two adaptations for different lamps, delivers comfort lighting at lowest cost for *any* industrial application. Today's lower-priced Day-Brite CFI-30 fixture, used with new Power-Groove lamps having an output of 15,000 lumens, actually reduces the cost of lighting many industrial areas as much as 54%.



25% uplight washes out harsh ceiling contrasts • "Up-draft" action provides more efficient self-cleaning • Center "V" and closed ends for added shielding and strength • Reflection surfaces are lifetime porcelain enamel for easy cleaning • 8-foot rigid channel, one-piece reflector for simplified installation • Spring-loaded sockets hold lamps securely, speed relamping • ALL THIS AT UP TO 17.7% LOWER COST!

UPLIGHT for higher lighting levels at lower cost

New lighting standards adopted by the Illuminating Engineering Society approximately *double* footcandle levels previously recommended. It is estimated that between 90 and 95% of existing lighting installations are now outdated.* And now, OPERATION UPLIGHT gives owners of industrial lighting systems these new reasons for relighting—without delay:

UPLIGHT for lower installed cost.

Day-Brite CFI-30 fixtures with new Power-Groove lamps reduce installed cost per square foot by *as much as 54%* because fixture prices are lower . . . and fewer fixtures are needed. And installation costs are also reduced because CFI equipment is designed to go up faster . . . with fewer parts to handle . . . and line up more easily.

UPLIGHT for lower operating cost.

The Taylor-Bradley research establishes *new maintenance factors* for industrial lighting . . . proves that Day-Brite CFI-25 fixtures lose *44% less* light output due to dust and dirt during 30 months' operation than units having solid top reflectors.

UPLIGHT for lower annual owning cost.

Day-Brite CFI-30 fixtures with new Power-Groove lamps reduce total annual owning cost by *up to 30%* compared with other fluorescent or mercury vapor systems . . . and *by 91%* compared with incandescent lighting.

PLUS . . . A BIG BONUS IN COMFORT.

Day-Brite's new CFI fixture not only delivers more light on the work plane, but also reduces eye strain and fatigue. Upward lighting *balances brightness.* Center "V" louver and fully enclosed ends (previously an extra cost feature on the CFI-25) help cut glare.

*ELECTRICAL CONSTRUCTION AND MAINTENANCE, NOV., 1958

This booklet tells how plant owners can save money through OPERATION UPLIGHT. For your copy, call your Day-Brite representative listed in the Yellow Pages. Or mail this coupon today.

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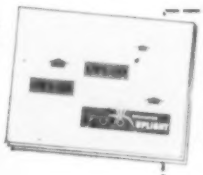

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HOW TO TREAT YOUR BOSS BETTER

DON'T bend his ear... cry on his shoulder... wring his heart... twist his arm... step on his toes

HOW TO LET YOUR BOSS KNOW YOU BETTER

Unveil "the real you" ... display your virtues ... and reveal your faults

HOW TO HELP YOUR BOSS—AND YOURSELF, TOO

Save his time ... brighten his outlook ... increase his information ... lighten his load

Takes some know-how (cartoons, facing page) to give the boss what he needs—and win what you need: his attention. That's why you (and your boss) will welcome these tips from author Uris, a savvy boss-handler himself. He says . . .

Yes, You Can Get the Boss's Ear

WE ALL WANT attention—and for an excellent reason. On the job or off, when someone pays attention to us we're more likely to get what we want, whether it's assistance, action on a complaint, or consideration of a favorite idea.

When it's the boss's attention we seek, there's added urgency:

- If we need help, he can give it.
- If we want to get a gripe off our chests, he's the complaint department that can remedy it.
- If we want to push an idea, he's the one who can act on it.

These considerations take on a special importance during a period of increased working pace, such as most managers are experiencing today. The manager, more than ever in need of his boss's ear for information and guidance to help him form decisions and plan action, has less time to make such contacts.

The boss is similarly caught in a time squeeze. Yet despite the increased pressure, communications must take place. The alternative is either the *status quo* or chaos.

WHY HE SEEMS DEAF

Your boss has still more listening problems.

First, he's the target for other managers. They, like you, must maintain communications with him to function effectively.

Second, his working schedule is likely to be top-heavy, in line with the formula: workload = activity × responsibility.

Third, as Swedish studies of top executive activity show, his time is likely to be chopped into small portions. His multiple activities keep him from having intervals of time greater than 20 minutes to devote to a single task.

That's why communications between two executives often take on a staccato pace, like the talk you hear coming out of a pay phone after the coins have dropped down, signaling that time has run out.

In spite of your good intentions—and his—a mahogany curtain drops down between you and the boss. The result is bewildered bafflement. Regardless of all your efforts and his good wishes for your success, that barrier remains hammered to the floor.

Messages pass through, but they're muffled, distorted, incomplete. If by chance you come face to face in out-of-office situations, you become aware briefly of the communications murk in which you've been operating. You've heard the proof many times, may even have voiced sentiments like these yourself:

"Bumped into J. B. at the restaurant last night and we had a heart-to-heart talk about things at the office. For the first time since I started to work with him, I feel he belongs to the human race."

Or, there's this version:

"Met the boss at a mutual friend's house a few nights ago. In a few minutes of shop talk we cleared up more stuff than I've been able to discuss with him in a whole month on the job."

The solution to inter-manager communications may all at once seem crystal-clear: "Why can't we set up a series of off-hours work conferences?" Unfortunately there are several objections to this plan:

- The idea might be okay with a subordinate. But the boss must multiply the time spent on one session by the number of his subordinates—and there goes his weekend.
- If the conference is arranged in advance, it's no longer "off-hours." This is not quibbling about terminology. For as long as the work context remains, and nothing else changes, the curtain will remain.
- The "solution" begs the question—it's like trying to "solve" the world's ills by retreating to a South Sea island.

You must solve your problem of communicating with your superior, if you can, within its physical and organizational framework.

Three Ways to Make Him Listen to You

Getting specific about communication needs with a superior may shed light on the causes and cures of the problem. Analysis shows that there are three moves that will result in effective contacts between an executive and his boss. If you make these moves, you'll find your communications troubles are over.

Turn the page

By AUREN URIS
Research Institute of America
New York City

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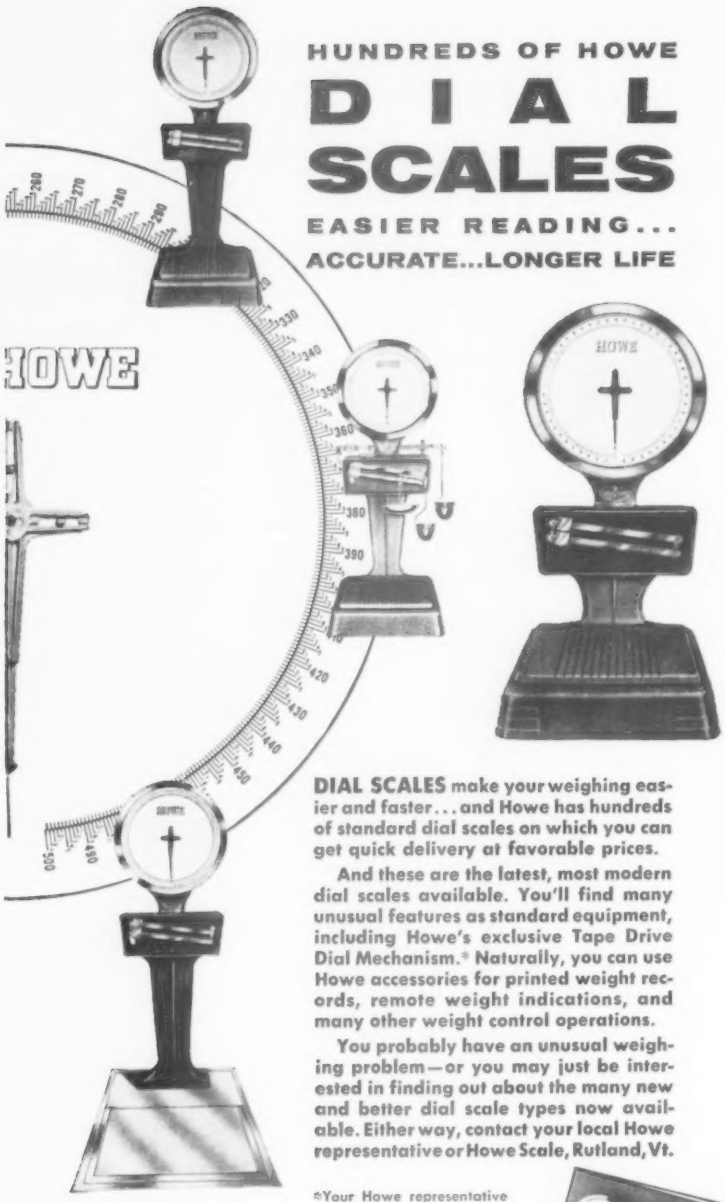

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GETTING THE BOSS'S EAR

Begins on page 208

Here are the three moves that are guaranteed (almost) to win your boss's ear whenever you need it:

1. MEET HIS NEEDS

Unknowingly, many a manager imposes on the self-control, good nature, or paternalism of his superior. (It's interesting that the paternalistic boss, usually the villain of the piece, figures as the patsy in our present discussion.) You must find ways and means to identify these communications pitfalls.

For every manager who complains, "My boss doesn't even know I'm alive," you can find a boss who can equally protest, "My subordinates don't realize I'm human, too."

What the boss is getting at is the frequent lack of consideration managers show for him. It occurs more often than you think. What's the explanation for this?

The thoughtlessness is not calculated. Usually it stems from the subordinate's job pressures and personal objectives. He wants to do his job well, look good to his boss. But to the extent that his performance depends on his superior—for example, in terms of the information and assistance he must get—he has to act aggressively to make contact, or risk doing without it.

So he must try to get his boss's ear, sometimes without being sure about the timing, or any other aspect—a subject may not be to the boss's liking, a decision may be one he'd rather not make, and so on.

To say you must be considerate of your boss's needs or sensibilities is merely to scratch the surface. What's needed is a series of explicit policies that will cut to the heart of the problem.

It's no accident that in our everyday idiom you find phrases that can guide you away from the pitfalls in upward communication. Living language that comes from the minds and hearts of people is a receptacle of much of our wisdom.

Now for a number of specific cautions to help you increase the likelihood that your boss will leave his welcome mat out for you:

• **Don't bend his ear.** Excessive demands on his time—excessive in

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3. *Double flanged outer race; bronze separator; single flanged inner race.*
4. *Double flanged inner race; straight outer race; bronze separator.*
5. *Straight inner race; double flanged outer race; bronze separator.*
6. *Double flanged inner race; single flanged outer race; retainer on opposite side; non-separable; steel retainer.*
7. *Double flanged inner race; single flanged outer race, retainer on opposite side; non-separable; full roller, no separator.*

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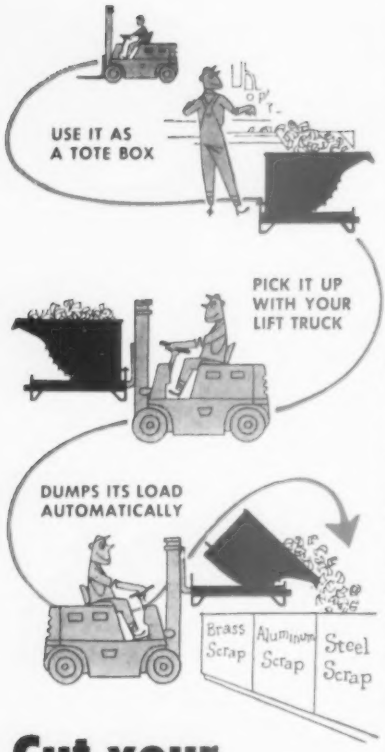

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terms of the subject you are discussing—are always undesirable. Don't expect him to devote hours listening to details of a changeover you are making if they really are details and if he has shown no particular interest in them.

Time of itself is not the measure of excess. It's the ratio between the nature of the subject and the amount of time you spend on it. A full eight hours devoted to a delicate policy matter may be too little; five minutes on a matter of no consequence may be gross waste.

Involved also is the injection of extraneous material. You're human and so is he. All work and no play is undesirable in conversation as well as in action. He probably is interested in your wife and kids and your golf score. But keeping these subjects out of a business conversation has never angered anyone. Forcing them in has led to considerable irritation.

• **Don't cry on his shoulder.** He's there largely to listen to your problems. But don't forget you're there to take the pressure off him.

True, your failures, your tough breaks, wear you down. And everyone likes to be commiserated with—likes sincere sympathy. But wouldn't you make out better in the long run if you unburdened yourself to a colleague? And, of course, there's that built-in marital shock-absorber, the little woman.

There are other reasons why crying on the boss's shoulder is undesirable. It's not just that he has troubles of his own. But the man who habitually pours out his hard-luck stories is likely to develop an unhealthy attitude toward himself and his responsibilities.

The sympathy-seeking executive is almost a contradiction in terms. The professional manager can't permit himself that kind of self-indulgence. The reason is simple: For the executive, tough luck must necessarily be a temporary affair. A setback is merely a situation that has taken a turn for the worse momentarily. Most of the time it's up to the manager to confront the new situation and work out the means to recoup his losses.

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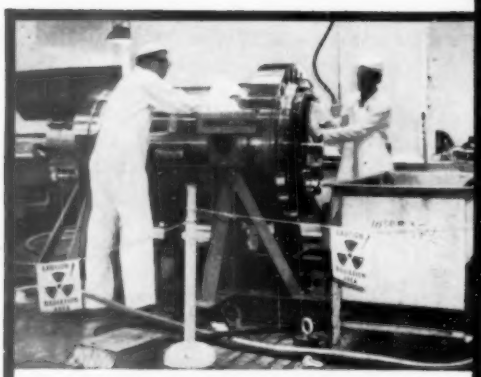
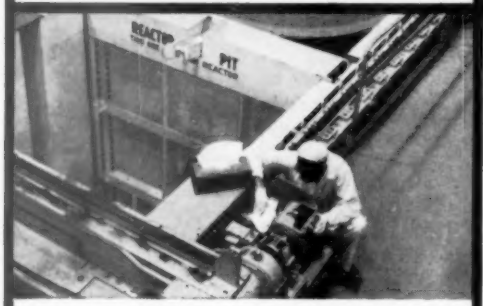


Scott Wipers are used in maintenance of main coolant pump for atomic reactor because they are disposable after each application. This reduces danger of using contaminated wipers for next job.



High wet-strength, lint-free Scott Wipers are used to remove condensation, dirt and corrosive materials from equipment around the nuclear reactor.

Scott Wipers have been stocked at plant since May, 1957. Personnel use them to wipe hands and faces as well as for maintenance.

World's first full-scale nuclear plant, owned by Duquesne Light Company, Pittsburgh, and the U. S. Atomic Energy Commission, uses Scott Wipers because:

Low unit cost of Scott Wipers makes them economical to use for decontamination work and equipment maintenance in atomic power plant

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I'm interested in modern wiping methods and ways to control wiping costs through value analysis and programming. Send me detailed case histories of wiping programs in these industries:

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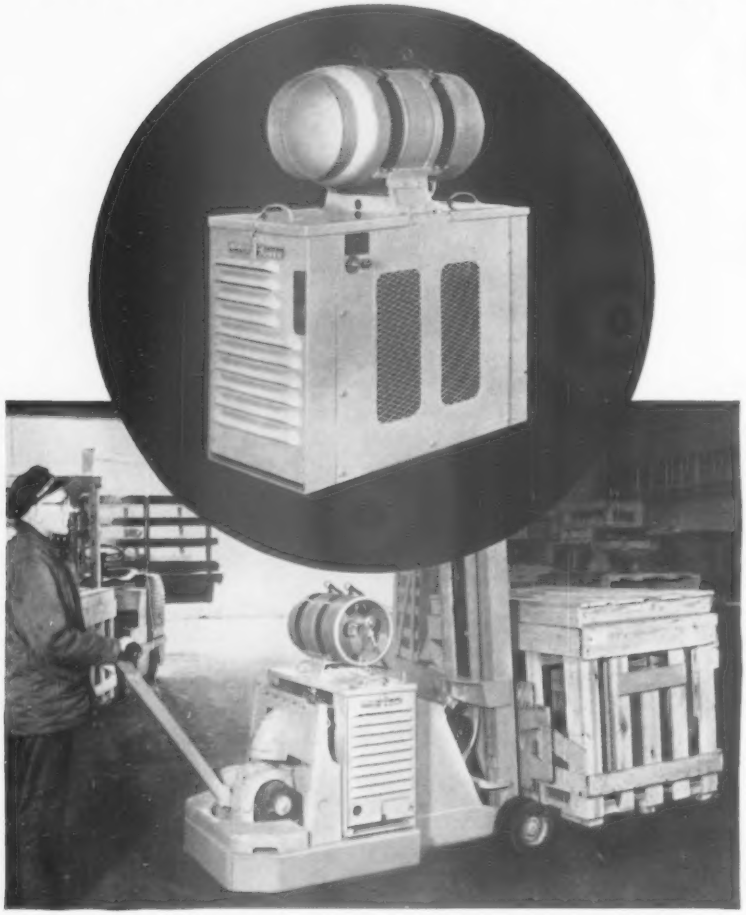

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Ready-Power combines full electric power *with no fatigue* AND the economy and low maintenance of LP-gas in one compact new power unit. Installation is quick and easy on any make of motorized electric hand truck with adequate sized power compartment. Bantam model W12 accommodates an interchangeable 20-pound fuel cylinder, includes a quick-disconnect fuel line coupling for safety, has removable end, side and cover plates for easy accessibility. LP-gas components are listed by Underwriters' Laboratories and comply with Factory Mutual recommendations. It's easy to convert your present trucks to this modern, full-production power. Specify "Ready-Power" when ordering new trucks. Write for information.

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For more facts Circle 576 on Reader Service Card

Begins on page 208

cate a setback to a boss, both the communicator and the recipient usually realize that talking time is replacing action time—and is therefore inappropriate.

• **Don't twist his arm.** "Boss, you've only got one more week to decide how we're going to handle the Acme order." There's a sadistic streak in some managers that makes that kind of sentence roll sweetly off the tongue. They'll tell you they're dutifully reminding the boss of a decision he must make. But it's obvious, since he has not yet made a decision, that it's not an easy one for him. So, with a certain amount of satisfaction, they keep turning the screws:

"The situation is getting worse every day, boss. What do you think we should do about it?" The "situation" referred to may be anything from employee relations to a batch of mix that's going sour.

It may be said there's no alternative to pressing the boss for a necessary decision. True. But you don't have to dump the situation on him like a ton of bricks.

See if you can't simplify his problem of decision-making. Can you suggest alternatives from which he may choose? Can you suggest a course of action backed up by sound logic that he can readily accept? Or can you supply some additional information that might clarify the picture for him?

• **Don't wring his heart.** As you know from your own experience as an executive, your boss often must make decisions involving a conflict between objective realities and personal feelings. Should he fire Miss Smith? Should Brown or Black get the promotion for which each has been working desperately?

Taking it even closer to home: should *you* get a promotion or a salary increase, or should a move be made that will mean an advantage to you in the operation of your department? Don't make it tougher for the boss by injecting personal issues where they don't belong.

Yes, in the proposed firing of Miss Smith the fact that she is supporting an elderly mother is pertinent. But it is only one of many factors that must be weighed. Don't make decision tougher by empha-

JOHNSON SERIES T-901 SUBMASTER THERMOSTATS
FOR CONTROL OF AIR, STEAM AND LIQUIDS

T-901 Submaster Thermostat

Series T-901 Thermostats offer an exclusive combination of features for applications where the control point of air, steam or liquid must be remotely adjusted in relation to the temperature of a second variable.

- Choice of elements:
  1. Fully compensated, liquid filled, stainless steel capillary with remote bulb. Straight or 8-ft. averaging bulbs available. Capillary lengths from 8 to 85 feet. Standard temperature range from −30F to 300F.
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- All elements are fully interchangeable.
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- Adjustable sensitivity. Extreme accuracy at low sensitivities.
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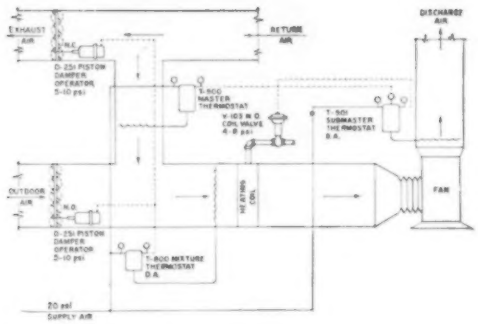
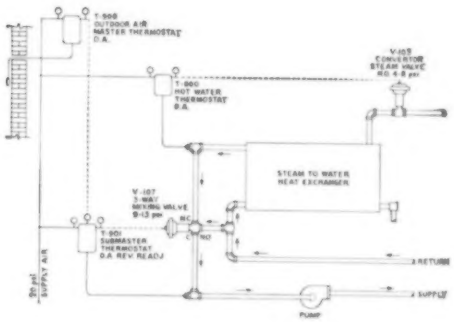
- Direct or reverse acting. Simple change of pivots converts from direct to reverse acting.

For complete data, write for Bulletin T-901. Johnson Service Company, Milwaukee 1, Wisconsin.



T-901 Submaster Thermostat controlling fan discharge temperature—reset from master thermostat in return air



T-901 Submaster Thermostat controlling hot water supply temperature—reset from outdoor master thermostat.

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sizing personal and subjective factors. Give him the information, but let him do his own moralizing.

• **Don't step on his toes.** You occasionally find among younger managers a brashness based on their unawareness of the line that separates their responsibility from their superiors. They are not only willing but eager to tell the boss how to think and what to decide:

"If I were you, boss, I'd rip down that shed and put up a two-story building in its place." Whether the idea is a good one is not the point. What's being conveyed is a suggestion. But it's being communicated in a way that may be poorly received by some superiors.

There's a classic case of an assistant to the president of an equipment firm. He couched his suggestions in these terms: "If you were smart, do you know what you would do?" The president felt he *was* smart—and fired his assistant.

Neutralizing the negative elements of your approach to a superior is one sure way of assuring yourself of at least an even break when he's parceling out time. But that's only part of the battle.

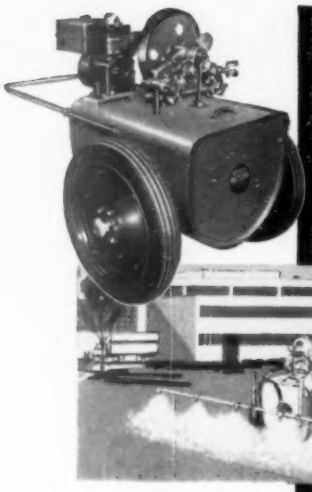
2. LET HIM KNOW YOU

Face up to a possibility without flinching: You may be your boss's Public Problem No. 1.

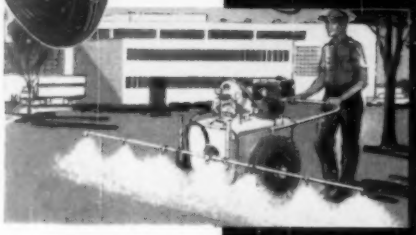
A manager's personal views, needs, and objectives in some respects clash with those of his boss. If you want contacts to be healthy and helpful, you should know the sources of these conflicts.

The boss's personal interactions with subordinates add prodigiously to his communications problem. Approaches used by these subordinates—including yourself—may explain part of the difficulty you have in reaching him. The essence of his problem is that in general he works with people more eager to be understood than to understand.

Pity the poor boss? Not at all. But be as cynical about it as you like, the fact remains that the more you can diminish the areas of misunderstanding, the better off you'll be. There's a general communications principle involved here: The



Mechanized Grounds Maintenance



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Floor controlled and combination floor and cab controlled cranes are available in a range of types and capacities. The steel bar warehouse pictured here relies on their "Euclid" to handle a big share of the work.

Semi-gantry cranes handle mill shipments and the various materials for the processing lines.

Chances are a survey by a qualified EUCLID representative may disclose an opportunity to improve your present facilities.

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Applied in cooling industrial machines or processes to temperatures approaching the ambient wet-bulb, the NIAGARA *Aero* HEAT EXCHANGER is independent of any more than a nominal water supply or disposal. The coolant system is a closed one, free from dirt and maintenance troubles.

Heat is removed from your process *at the rate of input*, giving you precisely the temperature you require and assuring the quality of your product. Heat may be added to prevent freezing in winter or for better control in a warm-up period. Liquids or gases are cooled with equal effectiveness.

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Niagara sectional construction saves you much installation and upkeep expense, gives full access to all interior parts and piping. Your equipment always gives you full capacity and "new plant" efficiency.

Write for Niagara Bulletin No. 132 for complete information

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For more facts Circle 582 on Reader Service Card

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Take less space, weigh less, smaller frames than the Brook standard totally enclosed fan cooled motors—yet, performance is equal. 1 to 40 HP*. Built to N.E.M.A. specifications for rerated motors. Same resistance to dust, fumes and moisture as the larger, heavier, standard frame t.e.f.c. motors. Maximum economy and lower first cost because of Brook modern production techniques and world-wide volume distribution. Warehouses, Sales Representatives, and Dealers throughout the country. Write for literature.

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BROOK MOTOR CORPORATION

For more facts Circle 583 on Reader Service Card

GETTING THE BOSS'S EAR

Begins on page 208

better you understand the person you're sending to, the more effective your communications circuit will be. The point is that, regardless of content, communications take place between people. Unless these individuals understand one another they have no way of establishing foolproof communications.

You can't communicate effectively with a person when you're in doubt as to whether you'll be understood. Yet that's the position of many an executive in relation to his subordinates.

The kind of understanding at issue is not the matter of the meaning of individual words, but the sense of an entire message. The president of a company on an out-of-town trip wires back to his executive vice president: "Smith Company has been buying Z-style transistors."

The president knows his man well enough to be sure that the executive V.P. will at once understand that his chief competitor has got a contract for which he was angling. He may also recognize additional implications of that one fact—some that the president himself might not see—and will react accordingly. Without such mutual understanding the communications ball will stop bouncing, either at one or the other end of its flight.

Let's see to what extent you can improve the relations between you and your superior, and in so doing, smooth your own path, and make life easier for him.

Establishing contact—Talk to a fair sample of top managers and you'll find there's general agreement on this statement: There's usually a barrier of formality and superficial contact between themselves and their subordinates. This is caused by lack of understanding, lack of perceptiveness, and lack of mutuality of feeling.

The owner of a food processing company told a field researcher of the Research Institute of America:

"The average manager I have known nearly always failed to put himself across with his boss. The reason is that he just assumes that as long as he keeps out of trouble his boss will spot his sterling quali-

Turn to page 222

For more facts Circle 584 on Reader Service Card ➤

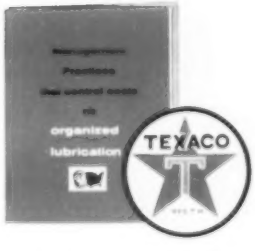
Good bet: You're paying for lubricants you don't need

Does this case sound familiar to you?

A midwest firm was buying lubricants on the recommendation of every department head, foreman or even operator. Inventory — often duplicated — was scattered all over the plant, yet shortages in one spot were never related to overstocks in another. The result: costly overstocking, extra handling, increased dangers of misapplication.

Management then instituted an Organized Lubrication Plan. Now they use 20 lubes instead of 97, have cut their purchase orders from 300 to 12 per year. Direct savings are estimated at thousands of dollars annually.

Can Organized Lubrication save money in your plant? Contact your local Texaco Engineer or write for "Management Practices that Control Costs via Organized Lubrication." The Texas Company, 135 East 42nd Street, New York 17, N. Y., Dept. F-82.



LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

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QUICK, FAST TESTING for carbon content is done not once or twice but 8 times per melt in A-L's Chem Lab with this direct reading Leco carbon determinator.

Carbon content checked 8 times during melt to guarantee A-L tool steel hardenability

Lab tests for carbon eliminate your guesswork; provide high hardness, uniform hardenability, reproducible tool performance.

Because carbon has the greatest influence on hardenability, Allegheny Ludlum watches it carefully during the melt. Testing a specimen for carbon takes only a few minutes. Therefore, A-L checks for carbon content 8 times during the melt, and makes the necessary adjustments to insure accurate control of carbon. This control means Allegheny Ludlum can hold carbon content to a closer range than most customers specify.

Carbon control at Allegheny Ludlum assures you of precise response to heat treating. This control in the melt brings you predictable, *high hardness, uniform hardenability* and *reproducible tool performance.*

This is just one of the many things A-L does to insure high quality. Here are some others: close control over forging techniques, rigid temperature-time programming, careful testing of billets prior to processing to insure good surface and sound interior, control over annealing to give you the right hardness for your exact machining operation, thorough metallurgical testing to insure top tool steel quality and meeting of your specifications.

Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier.

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every grade of tool steel... every help in using it

For more facts circle 585 on Reader Service Card

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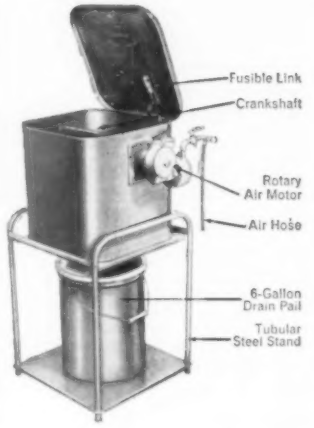
FLAMMABLES CONTROL METHODS AND PRACTICES IN PRODUCTION, PROCESSING AND IN MAINTENANCE

WHAT'S NEW...

PROTECTOSEAL AUTOMATIC WASHER FOR PAINT MASKS AND STENCILS

The Protectoseal Catalog No. 761 Washer automatically cleans paint-clogged spray masks and stencils while operator continues production work . . . requires no attention during washing cycle. Spray masks and stencils are secured to motor driven crankshaft which rotates them through solvent to provide thorough cleaning action. Spray masks are always clean and ready for instant use. No production part spoilage or lost time due to dirty, distorted masks. Washing principle operates on any compressed air supply . . . unit takes only 2¼ sq. ft. floor space.



For Further Information Circle Item 21 on Coupon

Flammables Storage Cabinet earns 3 more approvals

The Protectoseal Flammable Liquids Safety Storage Cabinet, designed to meet the specifications of the N.F.P.A. for on-the-job storing of up to 45-gallons* of flammables, has recently been approved by 3 more official agencies: National Fire Protection Association; Board of Standards and Appeals for the City of New York; and the Pennsylvania State Police, Bureau of Fire Protection. These time-saving cabinets will now carry all 3 approval labels on the front doors.

*When stored in approved safety containers of not more than 5-gallons capacity each.

For Further Information Circle Item 11 on Coupon

Speeds screw machine output at Pyle National

Placed conveniently near the screw machines at the Pyle National Company plant in Chicago, Protectoseal *Air-Matic Parts Washers* clean parts after machining to remove chips, cutting oil and grease while the operator continues his work without loss of time.

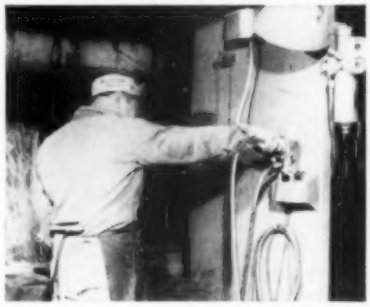
Operated by a simple, effective air motor, a metal parts basket in the tank is moved through the cleaning solvent with a minimum amount of turbulence to reduce solvent evaporation yet provide an effective cleaning motion. A reciprocating compressed air motor is employed, rather than an electric motor, to avoid the possibility of sparks. A fusible link assembly automatically closes the tank cover in the event of fire.

For Further Information Circle Item 20 on Coupon

Prevent spray gun clogging— cut lost production time

The Protectoseal *Self-Cleaning Spray Gun Holder*, in use for more than five months in the finishing department of an automotive manufacturer, has saved, "four hours spray gun cleaning time daily."

The unit is designed to keep only the nozzle-tip of a paint spray gun immersed in solvent when the gun is not in use, to prevent paint from hardening



at this point. It is not necessary to remove paint and air hoses. The unit is small, compact, and may be mounted in spray booths at the correct working level.

For Further Information Circle Item 22 on Coupon

DATA OF INTEREST AND VALUE TO PLANT MANAGEMENT

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For more facts Circle 586 on Reader Service Card

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EDISON NICKEL-ALKALINE STORAGE BATTERIES

Another Product of McGRAW EDISON

222 For more facts Circle 587 on Reader Service Card

GETTING THE BOSS'S EAR

Begins on page 208

ties. But the boss doesn't get close enough to him to tell him apart from the man who delivers the clean towels once a week."

This is an area of management life that's rarely discussed. It's too touchy, we feel. We don't like to stick our necks out and reveal our own experiences. But it's important for your superior to know you as a person.

Establishing a personal relationship of this kind, however, is not a simple matter of making a few "right" moves. It doesn't even mean increasing the number of your contacts, nor should it mean adopting a continual policy of putting your best foot forward.

English author Stephen Potter's satiric concept of "Gamesmanship" and Shepherd Mead's approach in "How to Succeed in Business Without Really Trying" portray in amusing fashion the devious devices that are available to the rascal who wants to plot his way into the good graces of his superior.

One of the things wrong with the gamesmanship tactic is that it's as obvious as an apple on a desk. Less spectacular but more effective effort is in order.

Showing "the real you"—Naturally you want your boss to know of your virtues or successful performances, etc. How about your weaknesses? Should you hide them?

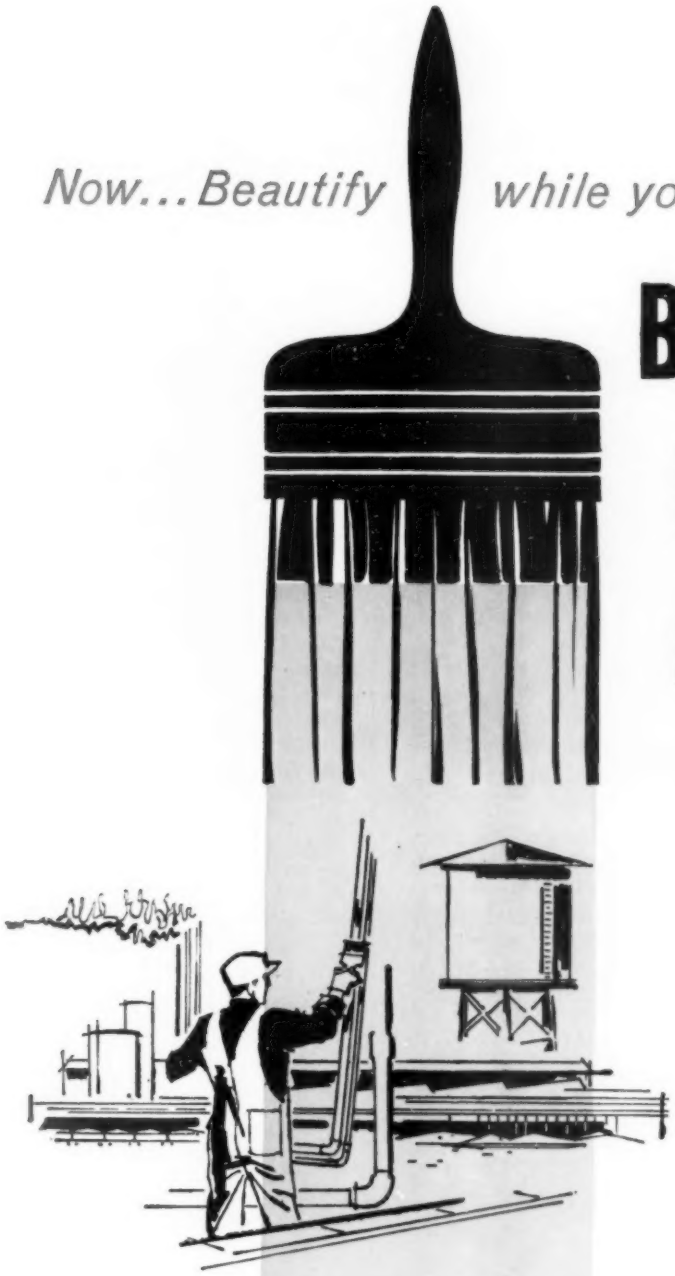
There are good reasons for not hiding them:

- Knowing your weaknesses, your superior is in a better position to help you—to back you up in the areas of critical performance.
- If you outgrow your handicaps with his aid, he cannot help being favorably inclined toward an improvement in which he himself has played a part.
- The boss who has a real feeling for people (and most of them have, you know) wants to know the whole man, strengths and weaknesses alike, rather than feel he's getting only part of the picture.
- More specifically, if you can avoid rigidity and formalism in your communications, the boss at once gets a clearer idea of what he must do at his end to click with you.

Turn the page

Now... Beautify while you protect with

BRUSH-ON COLORED ALUMINUM PAINTS



Dazzling new colored aluminum paints and roof coatings are now offered by leading paint manufacturers using Reynolds Aluminum Pigments. These coatings *decorate* roofs, fences, masonry, tanks, fixtures and machinery —and *protect* them with a tough aluminum "shield." These eye-appealing colored aluminum coatings don't have to be sprayed on . . . an ordinary paint brush will do the job.

The new colored aluminum paints still give you all the famous aluminum advantages: heat reflectivity, insulation, corrosion resistance and protection against rust. Yet these new paints are economical to use, and are available in formulations suitable for indoor and outdoor use.

Reynolds does not make paint, but does supply the finest aluminum pigments to leading paint manufacturers. For further information and names of manufacturers, write *Reynolds Metals Company, Box 2346-PJ, Richmond 18, Virginia.*

See Reynolds TV show—
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For more facts Circle 588 on Reader Service Card

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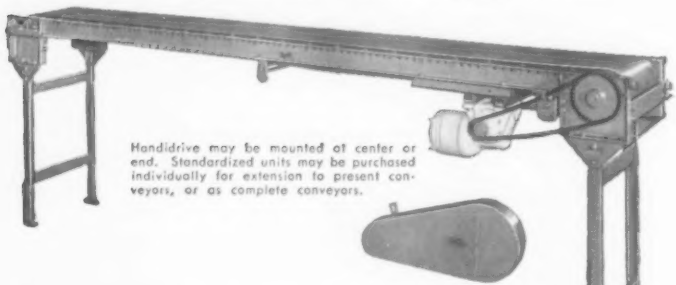
Handidrive conveyors may be individually leveled or inclined. Independent units may be purchased separately to construct power conveyors as desired.

Let Standard show *you* how to build or convert your own conveyor systems with Handidrives. Write: STANDARD CONVEYOR COMPANY. General Offices: North St. Paul 9, Minn.



Handidrive may be mounted at center or end. Standardized units may be purchased individually for extension to present conveyors, or as complete conveyors.

Ask Standard how to cut costs with conveyors

Send for Handidrive Bulletin No. 64. Write Dept. G-4

Standard

GRAVITY & POWER CONVEYORS

Sales and Service in Principal Cities

OVER 50 years of conveyor experience

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GETTING THE BOSS'S EAR

Begins on page 208

3. HELP HIM—AND YOURSELF

When a salesman calls on a prospect and walks out with an order in his hand, we know he has successfully completed his communication.

Few managers are as goal-oriented in their communications as salesmen are. They just don't know how to clothe their messages. While the literature of salesmanship abounds with all kinds of discussions and methods on the subject of Closing, management literature on communications concerns itself more with the formalities—you might almost say the niceties—of the exchange of ideas.

It's not being suggested here that, in your contacts with your boss, you resolve to "sell him" on every idea, point of view, or your side of a situation. But, like the salesman, you should be alert to the means by which you increase your chances of completing your communications successfully. Your purpose is to make the best use of the time you are finally able to spend with your boss. You accomplish this objective by emulating the successful salesman: Include benefits of your ideas and views.

The star equipment salesman gets that way by walking into a prospect's office and saying, "Here's what my machine can do for you." He seldom wastes his breath extolling the performance features alone. Of what import is it that the machine is made of a new heat-resistant alloy? Unless that fact is translated, it may not even register: "Idle time on our equipment is actually 30% less because breakdowns at this point just never occur."

Perhaps extolling the salesman's approach has been somewhat misleading. You don't have the same relationship with your boss that a salesman has with a customer. What's intended here is an emphasis on the needs of the person to whom you're sending—that is, your boss. These needs grow out of the nature of his executive position. By understanding the purposes of your communications to him—other than merely conveying information—you heighten your chances of success.

Here's a personal four-point program that can help you make the

US RUBBER **ROYAL V-BELTS**

THE NEW, ALL-NEW
U. S. ROYAL V-BELT

NEW *all new* because its cords are treated by an entirely new automation process. Every cord is impregnated with latex in every fiber (not merely surface-coated). Every cord is then built into the belt under tension, with errorproof electronic precision to insure that each will pull its uniform share of the load.

NEW *all new* because the belt is cured by a unique method of molding developed by U. S. Rubber. Consequently there can be no inner or outer imperfections, no harsh bumps. This means smooth-running performance, long belt life.

NEW *all new* because the new covers of new fabrics become a homogeneous blend through new molding techniques. This results in longer belt life by increasing wear resistance.

NEW *all new* because this new method of construction results in strength to spare... a reserve of strength which combined with vibration-free running, results in greater drive efficiency.

NEW *all new* because U. S. Royal V-Belts feature perfect matchability. Born matched, they stay matched.

U.S. Royal V-Belts are in stock at all "U.S." Transmission Distributors. • • •

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Name_____

JUST CLIP TO LETTERHEAD AND MAIL

GETTING THE BOSS'S EAR

Begins on page 208

best possible use of the communications time you spend with your boss:

Save his time—"I know you're rushed, Boss. But if you can give me 15 minutes of your time now, we can clear up a lot of details that might cause serious complications later on."

Call it being on the ball, or what you will. When you anticipate problems, you forestall time losses later on. These efforts have the effect of taking some of the load off his back.

Brighten his outlook—No one in the business world today is spared an occasional enforced tour through the valley of despond. Sometimes that valley can be double deep and double wide.

With this in mind, the assistant works manager of an electrical instruments plant recently explained: "When the breaks are tough, I make it a point to dig out some facts on the brighter side. For a man like my boss, who takes his failures pretty hard, a little encouragement acts like a blood transfusion."

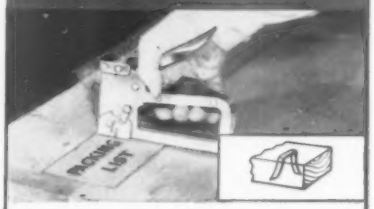
Increase his information—This is the old apple about keeping a superior informed. It's as fresh today as when first picked up by management developers. But now a more effective application is possible.

Give this idea a broader-than-usual interpretation. Generally it refers to the situations within the area of your immediate responsibility. You're supposed to let your boss know how employees are responding to a new company policy, what the inventory is on key materials, and so on. But an updated version of the principle suggests that, if you take a broader view of your responsibility, the kind of information you convey upwards will include not only factual material but also developments, imminent or potential, that can help him do somewhat longer-range thinking and planning.

"Boss," you may say to him, "it may be years off, but some day someone's going to develop a continuous process to replace our present batching. Do you think it might pay to go over our equipment needs with that thought in mind?"

What's being communicated here is a consideration that "keeps him

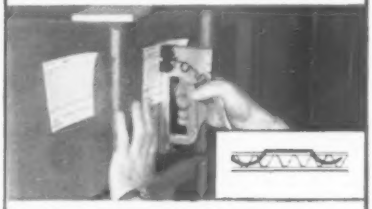
Learn how DUO-FAST can save you money



DUO-FAST Gun Tacker makes short work of attaching tags and labels to wooden boxes, etc.

DUO-FAST Air Plier speeds stapling of special cartons, corrugated filler, bags, etc. Powerful, yet portable.

DUO-FAST Hammer Tacker — fastest, easiest method of applying protective pads, boxcar linings, etc.



DUO-FAST Outward-Clinch Stapler solves the problem of attaching labels to filled cartons. No anvil needed.

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Most causes of excessive trichlorethylene consumption can be corrected quite promptly when the proper, exact procedure is followed:

1) Operational study by a qualified degreasing engineer.
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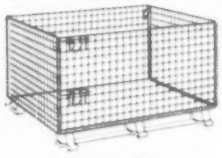
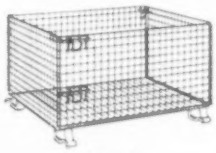
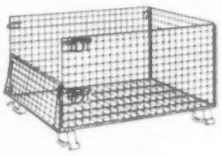


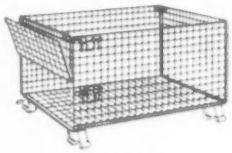
Bearing Plate



Hi-Lode



Warehouse



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What's it costing you to handle materials to and from production or assembly lines, in and out of storage, truck loading and transporting? There is an *easy way* . . . a practical, economical way with versatile USP Palletainers.

Palletainers have simplified materials handling for thousands of plants in scores of industries. And, these practically indestructible containers can save you valuable time and money both in and out of your plant. Whether you're processing, storing or distance-hauling, Palletainers provide the practical answer. Available in four basic types and a broad range of practical standardized sizes. They're engineered for safer handling, ceiling high stacking, faster 8-way entry for fork truck plus the advantages of content visibility for speedy inventory.

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GETTING THE BOSS'S EAR
Begins on page 208

informed" in a way that may have major benefits for all concerned.

Lighten his load—There are dozens of ways in which this can be done. Here are some of them:

- Present communications as clearly and concisely as you can.
- Add visual material—charts, graphs, models—that tell your story swiftly.
- Give him the heart of the story first, the details later.
- Refrain from leaving for him details that you can handle, perhaps more easily.
- Foresee eventualities, so that one conference, for example, covers a situation well enough to make further talk about it unnecessary.
- Cooperate with your colleagues, so that you and a fellow executive can hold a three-way meeting and settle a problem, so the boss won't need to go over the same ground again with the third man.

At this point, it should be clear that helping your boss on his own terms has built-in advantages for you. In this unselfish approach to communications upward, you can:

Keep your communications goal-oriented—Know what you're after and slant your message to its achievement. If you want to convey information—for example, the present operating condition of your equipment—don't let any digressions or extraneous subject-matter sidetrack you. Stick to the point, and the qualities of brevity, clarity, and so on, will follow naturally.

Sell the consequences (or benefits) of your ideas or suggestions—In so doing, you translate bare facts into meaningful action terms. For instance, you might take a statement that downtime has been increasing in your division, and add that you conclude major changes in maintenance schedules are needed.

Remember the basic purposes of your activity. They are often supportive. Your job is to help your boss do his job. By including in your communications elements such as lightening his load, and so on, you provide the plus factors that make your communications doubly effective. To communications of such kind and quality, a boss will always lend an ear. **END**

Tuffy Tips —on safe use of Slings and Hoist Lines

Professional Weight Lifters Work the Safety Angles

Here's a tip that could save an injury and absenteeism. The weight lifter's secret is proper leverage. Plus use of major leg muscles instead of back muscles. The weight lifter never leans over to pick up the load. He squats down as near as possible to it, and keeps his back erect all the time. Lifting action comes from legs and thighs. If you must use muscle for some of the lighter lifting jobs, these points are worth remembering. But wherever possible—and always for heavy loads—use hoists and slings.

How to Play It Safe When Loading Slings and Hoist Lines

1. **Keep pull** on sling legs in a straight line. Never shorten legs with knots or I-bolts. If choker and basket hitches are used on slings, check rated load limits.

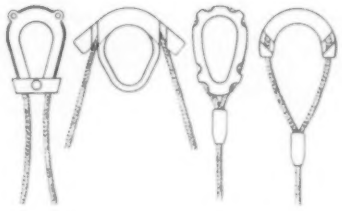
2. **Load slings** on the center of hooks. Never at their points, except for hooks specially designed for point loading.

3. **Never use** load hooks that are bent open. They have been overloaded, and may drop loads with disastrous results. Same goes for defective chain blocks. Insist that your men report them at once.

4. **Lubricate wire ropes** at regular recommended intervals, with lubricant recommended by your local oil company engineer.

Proper Fittings Can Give Slings Added Safety and Service Life

The sling eye is usually the point of greatest wear in load handling. The proper sling fitting acts as a shield to take the brunt of this wear—the load shocks, abrasion and other stresses concentrated in the eye. Shown here are some of the Tuffy fittings you can have factory-installed in your Tuffy Slings, or they can be installed in your own rigging loft. Left to right: (1) **Equalizing Thimble** permits adjustment of the length of sling legs so that loads of varying dimensions may be picked up and handled on an even keel. (2) **Newco Sling Bridle** will not slip when handling unbalanced loads. (3) **Newco Slip-Thru Thimble** allows passage of an identical thimble through its eye—necessary when a regular sling is used as a choker sling. (4) **Newco Slip-On Thimble** eliminates flattening or pulling together of eyes under heavy loads; can be attached or removed in seconds.



Tuffy Sling Stamina is Matched in Tuffy Hoist Line

Tuffy Hoist Line is a special rope construction for use on all types of overhead cranes, derricks and clamshells. Like all Tuffy Special Purpose Ropes, it has the right combination of strength, flexibility and toughness for greatest safety and longest life in its specific range of uses. Tuffy Slings and Hoist Line make a team that cuts hoisting costs and downtime in every type of materials handling.

Your Tuffy Distributor Offers the Most in Service and Savings

Tuffy Braided Wire Fabric: Successor to Wire Rope in Slings

The unique machine-braided construction of Tuffy Slings provides a combination of "free flowing" flexibility and toughness never possible with ordinary wire rope. The difference is in the patented 9-part fabric, braided by precision machines in a process that eliminates inequalities of hand-braiding.

Kinks Are No Hazard with Tuffy Slings

One of the first rules of safety: never use a wire rope sling that has been kinked. The wires are permanently bent, damaged or weakened. Not so with Tuffy Slings. Tuffy's patented, 9-part machine braided fabric is just about impossible to kink. And if it does, under some unusual condition, you can straighten out the kink, leaving no material damage.

Tucked Eye Splices— Gripped in Steel for Strength and Safety

This Tuffy ferrule, slipped over the tuck-splice of the eye and pressed on under tremendous hydraulic pressure, holds so tight that it gives the eye splice 100% of fabric strength. The ferrule itself is smoothly tapered to meet the main body of the sling. No abrupt edges or rough projections to injure hands and slow down work. The extra life, efficiency and safety of Tuffy's pressed-on ferrule is yours at no extra cost!

FREE! New Tuffy Sling Handbook

Revised and enlarged edition of this famous sling manual. Covers slings from A to Z. Types, dimensions, weights, rated loads, fittings. Even includes safety-approved standard signals used in operation of various equipment. Send for your free copy now. Union Wire Rope Corporation. Specialists in high carbon wire, wire rope, braided wire fabric and stress relieved wire and strand. 2234 Manchester Ave., Kansas City 26, Mo.

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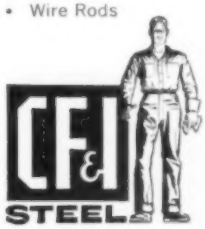

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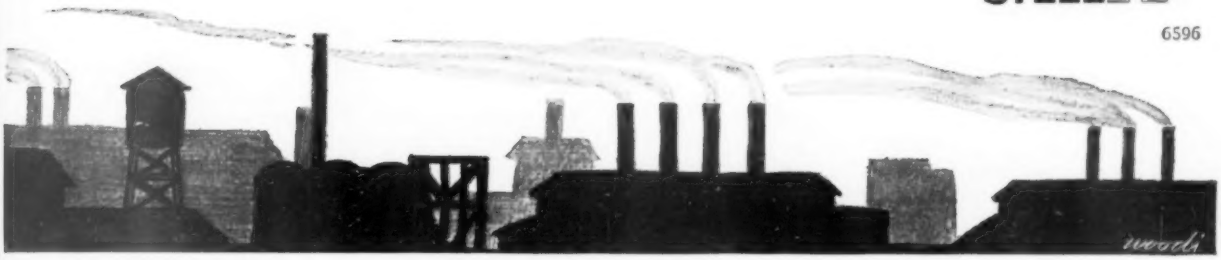

FACTORY CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

ELECTRICAL

1—Metal-Enclosed Bus. Ratings and construction details of isolated and non-segregated phase bus are given in 20-page bulletin (2604-1A). Includes info on large size conductor, bus auxiliary equipment. *I-T-E Circuit Breaker Co.*

2—Motor Application Guide. Nine major factors in motor selection are listed in this 16-pager (Form 270A). Has polyphase, single-phase and direct-current charts with starting and running torques; other data. *Century Electric Co.*

3—A-C Motors. Bulletin B-2103-4 (12 pages) tells how to select motors from 1 through 200 hp. Explains NEMA design classes, speed-frequency relationship, current and torque values. Diagrams. *Reliance Electric & Engineering Co.*

4—Right-Angle Gearmotors. This 4-pager (No. 3050) gives info on gearmotors with ratings of ⅓ to 30 hp., single reduction, output speeds of 23 to 280 rpm. Includes cutaway view of unit, specifications, photos. *The Louis Allis Co.*

5—Generators and Motors. Here's a 4-pager that explains stationary-exciter-coil synchronous machines. These brushless generators offer high speed and operation, and adaptability to any cooling method. Photos. *Jack & Heintz, Inc.*

6—Vapor-Cooled Transformers. Catalog B-7602 (8 pages), entitled "Vapor Cooling," covers principles and practice. Transformers are easy to install, fire- and explosion-proof. Photos, diagram. *Westinghouse Electric Corp.*

7—Aluminum Rigid Conduit. This 6-page catalog describes new lightweight, non-magnetic, and non-sparking conduit. Includes info on couplings and 90-deg. aluminum conduit elbows. Gives dimensions and other technical data. *Kaiser Aluminum & Chemical Sales, Inc.*

8—Motor Controls. Illustrated catalog No. 14 (80 pages) is arranged for easy reference to motor controls and accessories. Lists and describes replacement parts. Heater tables, motor charts. *The Arrow-Hart & Hegeman Electric Co.*

9—Primary Distribution System. Technical Bulletin RCP-790 (20 pages) supplies step-by-step instructions for installing new primary overhead insulated system. Gives component data, application photos, drawings. *Rome Cable Co.*

BUILDING AND EQUIPMENT

10—Adhesives for Concrete. Liquid polymer/epoxy resin adhesives for bonding new-to-old and old-to-old concrete are discussed in 8-page technical bulletin (RMD). Includes test results, applications, etc. *Thiokol Chemical Corp.*

11—Curtain Walls. This 4-pager illustrates space-saving roll-up type walls for large indoor areas. No guide tracks or storage pockets are needed. Come in aluminum, stainless steel, painted galvanized steel. *The R. C. Mahon Co.*

12—Acoustical Products. Catalog No. A1 (8 pages) lists physical and acoustical characteristics of four materials. Gives flame resistance, light reflectance, table of sound absorption coefficients. Photos, drawings. *Baldwin-Hill Co.*

13—Gratings, Partitions. Two catalogs: No. 5911 (24 pages) describes safety Grip Strut grating in one-piece construction, and welded grating. A 4-pager covers expanded metal partitioning with Quick-Erect fittings. *The Globe Co.*

14—Welded Steel Pipe. Specs and other info are given in 40-page catalog (8558). Pipe comes with variety of linings and protective coatings, lengths to 60 ft., diameters from 6 to 36 in., wall thicknesses $\frac{7}{64}$ to $\frac{1}{2}$ in. *Armco Drainage & Metal Products, Inc.*

15—Concrete Floor, Roof. Here's an 8-pager (Form L1) that tells how this system provides low-cost structural concrete floor or roof. Shows design features, diagrams of heating and plumbing details, etc. *The Flexicore Co., Inc.*

16—Quick-Seal Couplings. This 20-pager (Q.S.R. 58) describes couplings for hydraulic and pneumatic applications. Covers three types: straight-through, single check valve, double check valve. Flow and pressure data. *Titeflex, Inc.*

17—Valves. Here are 20 pages of info to help you in selecting valves. Cover oil, water, or air types, and feature manual, foot-operated, and solenoid valves. Over-all pressure range from vacuum to 10,000 psi. *Barksdale Valves.*

MAINTENANCE

18—Compressed Air. Catalog No. D3 (12 pages) discusses compressed air problems and how to solve them. Describes air dryer; gives dewpoint, operating capacities, sizing graphs; specs; accessories; photos. *Van Products Co., Inc.*

19—Primary Battery. This 8-pager explains outstanding features of reusable battery. Compares battery's energy and power with other systems. Discusses applications, fast activation, wet stand, recycling, etc. *Yardney Electric Corp.*

20—Hose Couplings, Fittings. Maker's line of fittings for every type of rubber hose is shown in illustrated 8-pager (No. 34). Describes couplings for various uses, clamps, valves, manifolds, nipples, inserts. *Hose Accessories Co.*

21—Masonry Anchors. Here's a 6-page catalog (Form 220) that discusses compounded anchors used for

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heavy-duty fastenings to masonry and concrete construction with standard machine bolts. Photos. *Star Expansion Industries Corp.*

22—Maintenance Finishes. This 24-page catalog (Form No. 04502) includes selection charts for exterior and interior paints, coatings, and specialties, with color samples. Includes tips on surface preparations. *The Glidden Co.*

23—Repairing Machines, Parts. "How to Make Your Own Machine and Repair Parts Quicker and Easier" is a 24-pager (No. 21) that helps you do just that. Care of machines, techniques of machining and welding. *LaSalle Steel Co.*

24—Air-Stream Pollution Control. Here's a 68-page booklet that contains papers given by experts in the field at a recent seminar. Describes how control of pollution has been accomplished in many communities. *American Cyanamid Co.*

PRODUCTION

25—Production Equipment. Booklet A-659 (12 pages) illustrates and describes complete finishing systems. Includes metal-cleaning, pickling, and rust-proofing equipment, spray booths, drying and baking ovens. *The R. C. Mahon Co.*

26—Inclinable Presses. Here's a 12-page bulletin (No. 52112) that covers OBI presses in capacities from 40 to 200 tons. Standard models are single-geared or flywheel type. Has specs, photos. *The Federal Machine & Welder Co.*

27—Surface Plates. Smoothness, stability, rigidity, and accuracy (down to 25 millionths) of precision granite plates are set forth in No. 621 (8 pages). Photos, tables of sizes. *Pratt & Whitney.*

28—Vertical Four-Slide Machine. Technical bulletin UB-3 (6 pages) discusses advantages of wire-forming equipment. Gives details and photos of feed assembly, tooling, drive and other components; specifications. *The Torrington Mfg. Co.*

29—Tube Benders. This 20-page catalog tells about precision benders in sizes up to 18 inches OD, and bar benders. Describes rigidity, accuracy, ease of set-up and operation of machines. Includes photos. *Wallace Supplies Mfg. Co.*

MATERIALS HANDLING

30—Hand, Power Equipment. This 6-pager (209-1) is a case history that tells how over 6000 sq. ft. of floor space in a multi-story building was saved by efficient use of hand and power equipment. Photos. *Lewis-Shepard Products, Inc.*

31—Bulk Handling Techniques. Bulletin No. 531 (12 pages) is titled "New Techniques for Automatic Bulk Handling." Covers pneumatic conveying methods, two polyethylene handling installations. *Dracco Division of Fuller Co.*

32—Tote Pans, Containers. Two 8-page catalogs: One has details on fiber-glass-reinforced polyester Stack-n-Nest tote pans; the other describes woven wood-and-wire boxes and containers. Both give uses, sizes. *G. B. Lewis Co.*

33—Storage Racks. Folder of descriptive material is called "Rack Reference Library." Includes 24-page booklet on rack design and construction; 12-pager on fixtures; 12 case histories of solved storage problems. *Tube-Strut Corp.*

34—Hoists and Cranes. Bulletin DH-28 (8 pages) describes and illustrates motor- and hand-operated hoists; jib, hand-traveling, and motor-driven cranes. Construction, weights, dimensions data, specs. *American Chain & Cable Co., Inc.*

35—Materials Handling Equipment. This 36-pager (Form 32) shows skids, boxes, pallets, dumping hoppers, racks, trucks. Illustrates equipment and gives specifications for various units. *Farb-Weld Corp.*

36—Air Hoists. Specs, operating data, and accessory info are given in 8-pager (No. 5145). Easy-to-read schematic drawings give dimensions for installing hoists. Capacities from 1000 to 2000 lb. Photos. *The Yale & Towne Mfg. Co.*

37—Straddle Carrier. Here's a 4-page catalog with specs and construction details for 40,000-lb. capacity Series 95 carrier. Charts and graphs show travel speed, gradeability, turning radius. *Clark Equipment Co.*

38—Feeders, Conveyors. Controls, specs, installation and operation info are given in 96-page catalog (No. 930). Other vibrating equipment includes barrel packers, coolers, dryers, magnetic separators. Photos. *Jeffrey Mfg. Co.*

39—Fork Lift. How the "Hi-Lifter" can raise 4000 lb. to 22½ ft. or 6000 lb. to 12 ft. at 24-in. load centers is explained in 4-pager (KM-615). Discusses forward and reverse speeds, 4-wheel power brakes, telescoping mast. *Kwik Mix Co.*

40—Scrap, Chip Handling. This 16-pager (S-90) describes steel belt conveyor system for press scrap disposal from press area to railroad cars; tube-veyors; belt conveyors to remove turnings, chips, and parts. *Prab Conveyors, Inc.*

41—Overhead Conveyor. Bulletin No. 159 (6 pages) describes new power and free conveyor system with a telematic route selector dispatch head. Dial can be set to guide carrier to any one of 80 stations. *Columbus McKinnon Chain Corp.*

MECHANICAL

42—Power Transmission. Two 4-pagers: One discusses speed reduction, screw conveyor, adjustable speed drives—both standard and wide range. No. WRB-58 covers wide range adjustable speed drives, equipment. *American Pulley Co.*

43—V-Belt Drives. Here's a 44-page manual (A695) that points out advantages of new V-belt drives. Explains construction of Dyna-V sheaves and belts. Includes tables and photos. *Dodge Mfg. Corp.*

Turn the page

Gets 40% savings in coolant costs by change to

Standard's Transparent Coolant

ARGON Oil No. 4

Chicago Saws, Inc., realizes other benefits in switch to this Standard Oil product

Situation: It all started when a Standard Oil lubrication specialist recommended ARGON Oil No. 4, Standard's transparent coolant to Chicago Saws for use in their grinding operations. This manufacturer of rotary saw blades decided to give it a try. They knew the product was the result of more than three years' work in Standard's research laboratory, and that it had been extensively field tested.

What happened: Using ARGON Oil No. 4 in 100:1 concentration, Chicago Saws was able to reduce coolant costs 40%. They also found the work could be seen more clearly when using this coolant. There was less wheel loading. They also discovered the coolant didn't foam and that its exceptional ability to carry off heat resulted in cooler operation. Faster cuts were obtained with finer wheels. Tolerances were easier to hold. Better finishes were obtained. Less frequent wheel dressings were required.

What you can do: Get more information about ARGON Oil No. 4 transparent coolant. Call the Standard Oil lubrication specialist near you in any of the 15 Midwest or Rocky Mountain states. Or write: **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Using ARGON Oil No. 4, Chicago Saws gets better finish at savings of 40% over other coolants tried. Operator is using .004" cut on heat treated Rockwell 60 C steel.

You expect more from **STANDARD** *and you get it!*

Quick facts about

Standard's Transparent Coolant

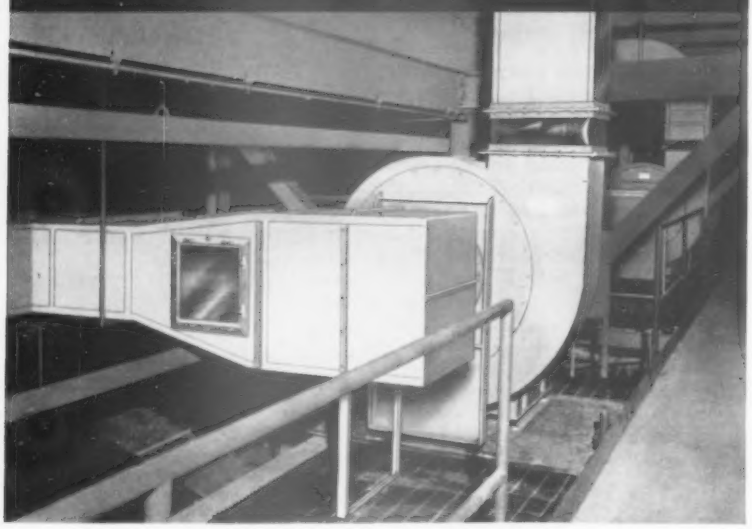
ARGON Oil No. 4

- Clear, transparent fluid
- All chemical. Does not support bacteria growth
- Unaffected by humidity
- Nonfoaming
- Fire resistant
- Odorless

Standard's Bob Stark and Chicago Saws' vice president Paul Bostrom discuss blades and coolants. Bob Stark is well qualified to work with manufacturers on the use of metalworking coolants. Bob has a chemistry degree from Illinois College plus three years' experience at Standard. He has completed the Standard Oil Sales Engineering School course.

problem: **Corrosive Acid Fumes**

solution: **Van-Cor Exhaust Duct System**

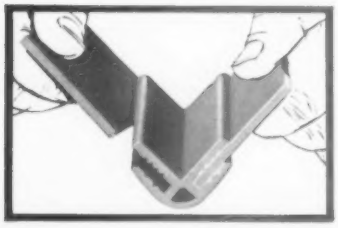


OVER 50,000 SQ. FT. OF VAN-COR SHEET AND JOINING STRIPS remove all acid, plating and cleaning fumes throughout the Allentown (Pa.) Works of Western Electric Co. Corrosion is stopped in its tracks because Van-Cor unplasticized PVC is resistant to scores of acids, alkalies and salts.

Although the contractor was unfamiliar with plastics fabrication, he was able to assemble the components of this system on the job site at a substantial savings over installation of prefabricated components. This savings was made possible through the use of Van-Cor joining strips.

VAN-COR FABRICATIONS, PIPE, FITTINGS, VALVES, CONDUITS offer *you* these advantages:

1. *Resist Corrosion of Industrial Acids & Alkalies*
2. *Light in Weight (½ that of Aluminum)*
3. *Easily Installed; High Tensile Strength; Low Flow Resistance*
4. *Readily Formed, Machined, Threaded and Welded*



Van-Cor 90° and H Joining Strips
The fast, low-cost way
to connect PVC sheet stock.

Write for Catalog and Name of Nearest Distributor

INDUSTRIAL DIVISION OF...
COLONIAL PLASTICS MFG. CO.
Subsidiary of THE VAN DORN IRON WORKS CO.
2685 EAST 79TH STREET CLEVELAND 4, OHIO

FACTORY / CATALOG NEWS

Begins on page 232

For more about these items, circle item numbers on Reader Service Card next to back cover.

44—Worm Gear Speed Reducers. New units that can be mounted in three different positions are covered in No. 2724 (8 pages). Illustrates mountings that solve space problems. Gives service factors, load classes, ratings. *Link-Belt Co.*

45—Speed Reducers. Catalog HSDR-58 (12 pages) presents new double reduction hollow shaft worm gear reducers in series "STD" torque arm and "SFD" flange mounted types. Includes dimensions, weights, photos. *Winsmith, Inc.*

46—Torque Converters. This helpful 16-page handbook (2740) is entitled "How to Get the Most Out of Shovel Cranes with Torque Converters." Explains what torque is, how it applies to shovel cranes. *Link-Belt Speeder Corp.*

47—Belt Saver Pulleys. Unusual design of cast-iron, wing- and cone-type pulleys is described in 4-pager (35-D). Gives diameter, minimum and maximum bores, and other info on about 500 different pulley sizes. *Sprout, Waldron & Co., Inc.*

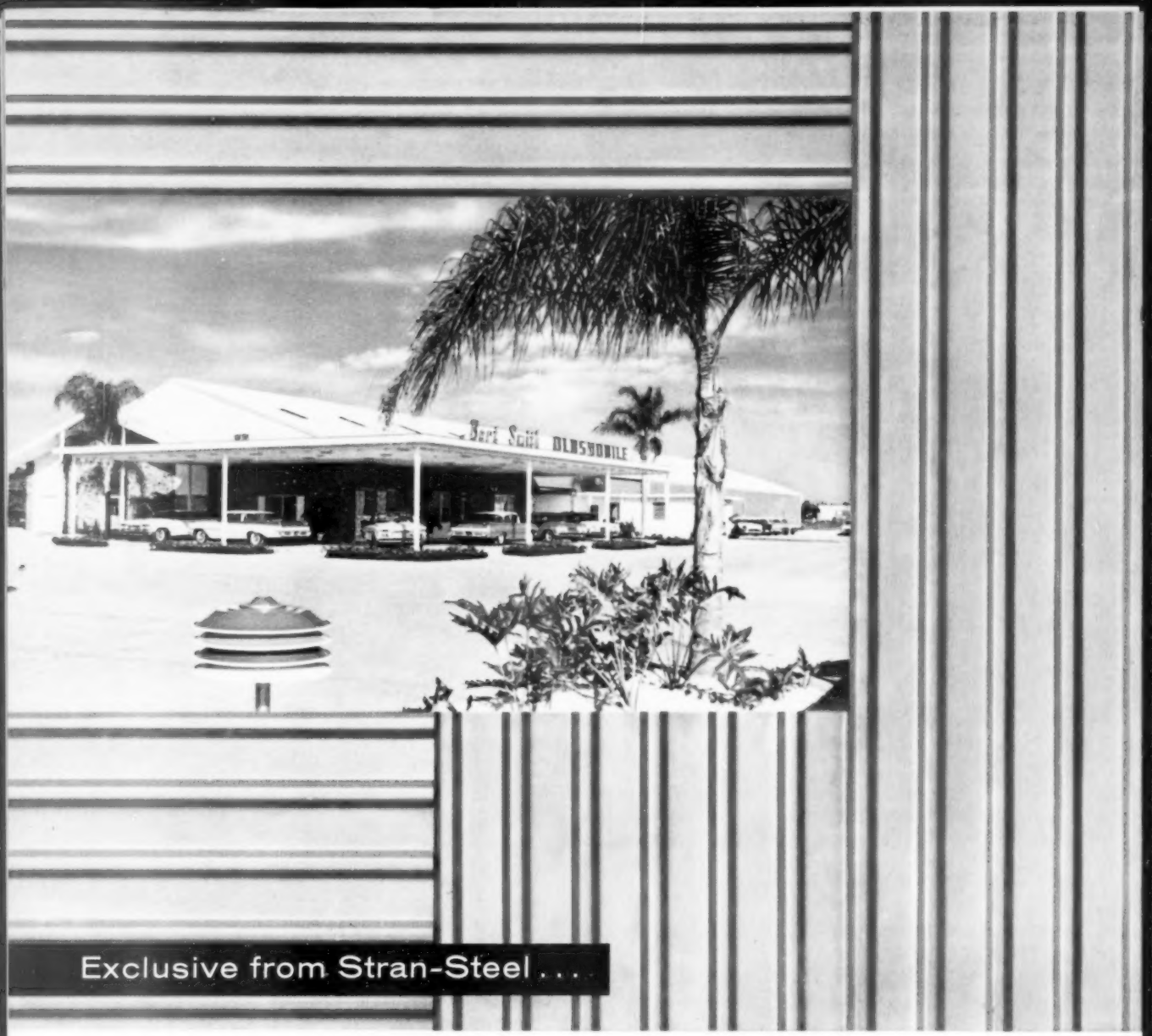
AUXILIARY

48—Air Movers. Catalog WRP4243 (8 pages) describes low-silhouette, high-capacity gravity ventilators. Come in two sizes and can double as skylights. Has capacity tables, illumination info, installation diagrams. *The Swartwout Co.*

49—Roof Ventilators. Here's a 4-pager that discusses power, round gravity, and continuous ridge ventilators. Cross-section diagrams, tables of capacities and dimensions, photos. *Bowman Steel Corp.*

50—Safety Switch for Hoists. Switch that automatically stops a hoist or crane before it's overloaded is described in Bulletin 17E (4 pages). Shows models and attachments; also load limiting applications. *W. C. Dillon & Co., Inc.*

Turn to page 240



Exclusive from Stran-Steel . . .

FOR THE FIRST TIME . . . STEEL BUILDINGS IN COLOR!

Now, Stran-Steel buildings come in six factory-applied colors—colors that add a distinctive luxury look, colors that build prestige and pride of ownership. For your new plant, office, warehouse or store, take your choice of blue, bronze, green, grey, rose and white or any combination. And the beauty is more than skin deep, because two-layer color coating is firmly baked on galvanized steel wall and roof panels. Weather-tested Stran-Satin Color is an integral part of your building. This means you can forget about costly maintenance.

Color is an exclusive advantage added to the list of Stran-Steel features: steel buildings that are column-free, flexible in size, quickly erected and easily expanded —with costs kept low by precision mass-production. Five-year purchase plan takes only 25% initial investment. Stran-Steel dealers are listed in Yellow Pages of your phone book under *Steel Buildings* or *Buildings—Steel.*

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DEALERS EVERYWHERE

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Title _____ Phone _____

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Address _____

City _____ Zone _____ State _____

1,000,000 SCREWS

Driven Without Clutch Adjustment

...and still going strong!

ARO Screwdrivers in daily use for over a year have driven 1,000,000 screws without clutch lubrication or adjustment! 000 series shown here; choice of suspension or pistol grip.

ARO gives you all this at no premium cost!

- **QUIET—GOLDEN SILENCE** performance—another ARO first! No loss of power . . . no loss of speed!
- **SMOOTHEST MECHANICAL CLUTCH** on the market . . . power to spare!
- **TORQUE CONTROL**—extremely accurate and consistent.

Complete line time-proven ARO air screwdrivers, nutsetters, drills, grinders, sanders for faster production! Backed by nation-wide Field Service.

Why pay more? See your ARO Distributor. Send for catalog 5927-T.

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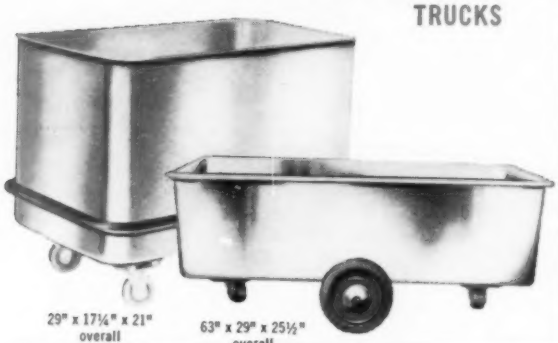
PORTABLE AIR TOOLS
Also Air Hoists...
Automation Tools...Air Motors

For more facts circle 601 on Reader Service Card

cut handling and storage costs...

WEAR·EVER ALUMINUM

TRUCKS



29" x 17¼" x 21" overall

63" x 29" x 25½" overall

MOBILE BINS

38 gallons

30 gallons

27 gallons

STORAGE DRUMS

50 gallons

30 gallons

4, 6, 9 and 14 gallons

TRANSPORT BOXES

20" x 15" x 5"

22" x 20" x 1⅛"

34 3/16" x 16⅛" x 12"

22⅛" x 20½" x 6½"

UTILITY ITEMS

16, 21, 48, 63, 74, 122 qts.

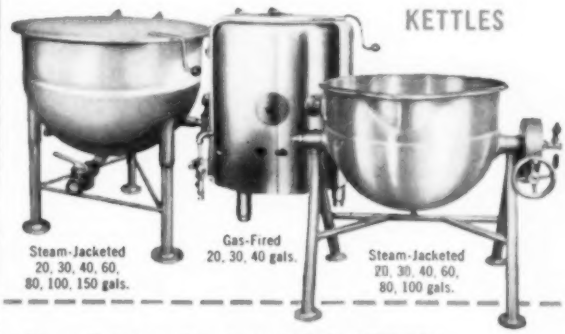
45" and 53"

18, 24, 32, 48 ozs.

10, 12, 14, 16 qts.

2 qts.

KETTLES



Steam-Jacketed 20, 30, 40, 60, 80, 100, 150 gals.

Gas-Fired 20, 30, 40 gals.

Steam-Jacketed 20, 30, 40, 60, 80, 100 gals.

Now you can speed production, and simplify your handling or storage problems with standard, readily available Wear-Ever plant service items like these.

Wear-Ever's complete line of handling, storage and service equipment is constructed from specially developed, tough, hard-wrought aluminum alloys to assure longer life.

Send for your free copy of our new catalog showing the complete Wear-Ever line.

New Catalog Ready! *SEND TODAY!*

Wear-Ever Aluminum, Inc.
508 Wear-Ever Building, New Kensington, Pa.

GENTLEMEN: *I'd like to learn more about ways in which Wear-Ever's line can help me.*

☐ Send me your catalog ☐ Have your representative see me

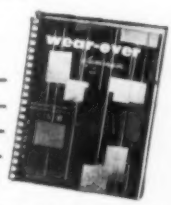
NAME_____

TITLE_____

COMPANY_____

STREET_____

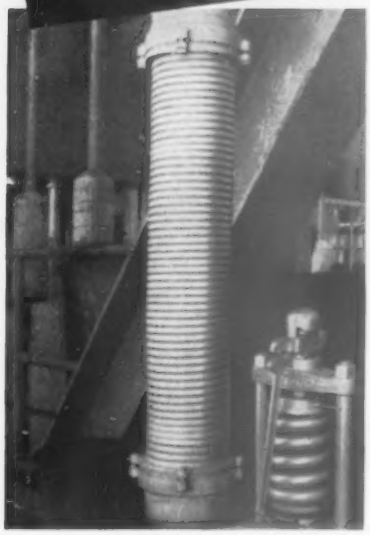
CITY_____ ZONE____ STATE_____



WEAR·EVER ALUMINUM, INC., FOOD SERVICE EQUIPMENT DIVISION, NEW KENSINGTON, PA.

PENFLEX

• CUSHIONS SHOCK
• PREVENTS BREAKS



PENFLEX TUBING ABSORBS THERMAL EXPANSION SHOCKS

Thermal expansion 900°F . . . pressures up to 850 psi. . . . impact and pipe movement under terrific strain, but Penflex safely handles them all. That's the story of Penflex 8" I.D. stainless steel interlocked tubing welded into the pipeline, eliminating the cost of flanging the joint as well as the pipe. This was installed as an expansion joint on safety blow-off valves.

Wherever thermal expansion, pressures and shock are factors in keeping steam, air, water or chemical lines from breaking you can rely on Penflex Interlocked Tubing and Penflexweld High Pressure Tubing. Available in steel, bronze and stainless steel from ⅛" I.D. to 24" I.D. Write for complete details to Pennsylvania Flexible Metallic Tubing Company, Inc., 7241 Powers Lane, Philadelphia 42, Pa.

GET NEW DATA BOOK AND CATALOG

PENFLEX

TIGHT AS A PIPE BUT...
FLEXIBLE

Circle 603 on Reader Service Card

FACTORY / CATALOG NEWS

Begins on page 232

For more about these items, circle item numbers on Reader Service Card next to back cover.

51—Fuel Oil Heaters. Advantages of heaters used on suction side of pumps for heating viscous fluids are given in 8-pager (No. 585). Info on tank suction and line-type heaters. *Brown Fintube Co.*

52—Air Filters. This illustrated 10-pager (248-C) describes operation of Roll-O-Matic automatic renewable media filter. Complete filter comes in six small cartons. *American Air Filter Co., Inc.*

53—Heaters, Chillers. Two illustrated catalogs: No. 304.4K1 (24 pages) presents heaters with extra-large steam inlet area. No. 8325 (revised 16-pager) covers chillers for various applications. *Industrial Div., American-Standard.*

INSTRUMENTS AND CONTROLS

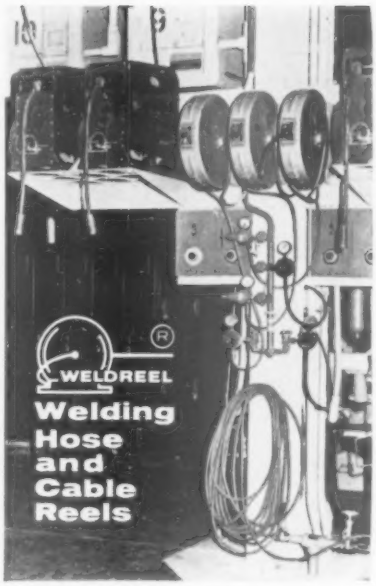
54—Temperature Probe. Bulletin No. 1048 (4 pages) explains how this moving device "patrols" critical boiler gas passages. Probe also warns of incipient hot spots during lighting off. Includes specs, photos. *Blaw-Knox Co.*

55—Conversion Tables. Chart (8½x11 in.) contains thermocouple temperature-millivolt conversion tables. Folds in half to give degrees Fahrenheit to millivolts on one side, Centigrade to millivolts on other. *Thermo Electric Co., Inc.*

56—Flow Rate Transmitters. This 12-pager (No. 170) points out design and other features of motion position transmitters. Performance data, diagrams, capacity tables, photos. *Brooks Rotameter Co.*

57—Magnetic Contactors. Two 4-pagers: No. 41-B1 covers contactors rated in 20-, 30- and 40-amp. sizes for air conditioning and refrigeration. No. 41-B2 describes contactors for current and horsepower rated applications. *Furnas Electric Co.*

Turn the page



AT PHILLIPS PETROLEUM

Plant safety is improved—hose and cable life extended—good housekeeping is made simpler — in Phillips Petroleum Corporation's refinery at Borger, Texas, by keeping hose and cable off the floor when not in use — with WELDREEL hose and cable reels.

WELDREEL reels pay out freely and lock automatically at desired length. A slight tug releases the locking pawl, allowing hose or cable to be automatically retracted.

Designed to handle flammable fluids and gases safely in dual and single hose, leakproof WELDREEL reels are adaptable to a wide variety of industrial applications. Write for full information.

MODEL OA-A holds 50' of 3/16" or 40' of ¼" dual hose. Model OAB has capacity for 150' of ¼" or 125' of 5/16" hose.

MODEL EA-2 with current capacity of 300 amps holds 50' of 2/0 welding cable. Model EA has capacity of 100' cable.

MODEL A-1 has 50' capacity of ¼" or ⅜" I.D. single hose. The larger Model A-2 holds 50' of ½" hose.

UNITED SPECIALTIES INC.
POST OFFICE BOX 698 EL DORADO, ARKANSAS

Circle 604 on Reader Service Card

INDUSTRIAL TILE

Built to take IMPACT

How much "smack" can your floors take without damage or disintegration? Duraco with its all-vinyl binder is built to take it – to really stand up under the bruising impact of dropped objects and rolling friction.

This remarkable industrial flooring is built to do a better job in plant and factory areas. It's greaseproof and acid-resistant – easier and safer to walk and work on – much easier and quicker to clean. It's the answer to lower floor costs per square foot per year in your plant. Let Duraco prove itself in your plant without obligation to you. Our representative will be glad to discuss the details of the Duraco Test Area Program with you.

SPECIFICATIONS

Available in 5 terrazzo colors, 5 marbleized colors – coordinated with accepted industrial color standards. Size 9″ x 9″. Thicknesses: Standard Gauge 3/32″ – Heavy Gauge ⅛″.

AZROCK FLOOR PRODUCTS DIVISION
UVALDE ROCK ASPHALT CO.
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We are interested in Duraco. Please have your representative call to discuss the Test Area Program with us.

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For more facts Circle 635 on Reader Service Card

Plastic Steel® saved over $1000... plus days of downtime for MARRINER

A broken centrifuge at Marriner Combing Company stopped production on an important order. PLASTIC STEEL was used for on-the-spot repairs and the machine was back in operation within an hour at a cost of less than $5.00. Using conventional repair methods would involve several days and cost over $1000.

Hundreds of companies have saved time and money by repairing worn machine parts, cracked castings, leaking hydraulic systems and tanks, rebuilding worn pumps or valves, etc., with PLASTIC STEEL®.

PLASTIC STEEL® and other Devcon products are used for making jigs, fixtures, metal-forming dies, plastic and rubber molds, foundry patterns and core boxes, and other industrial tools.

PLASTIC STEEL® — as easy to use as modeling clay — hardens to steel-like strength in 2 hours . . . can be machined with regular tools. Bonds all metals, wood, glass, concrete, etc. to itself or each other. Extremely high tensile, compression, impact strength — excellent chemical resistance.

Find out how PLASTIC STEEL® and other Devcon products can save time, cut maintenance costs and speed production in your plant — write for FREE bulletin today.

Distributed nationally by leading industrial suppliers

DEVCON CORPORATION

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Circle 606 on Reader Service Card

FACTORY / CATALOG NEWS

Begins on page 232

For more about these items, circle item numbers on Reader Service Card next to back cover.

58—Indicating Control. These 4 pages (MC-176) describe temperature controller housing and switching arrangements, covering temperatures from −150 to 700 F. and current ratings to 20 amp., 125 VAC. Specs, photos. *Fenwal Inc.*

59—Process Control Calibration. Electrical and mechanical specs are given in illustrated 16-page catalog-manual. Includes application data with diagrams to show how to interconnect instruments for various uses. *Technique Associates, Inc.*

MISCELLANEOUS

60—TV Cameras, Equipment. Two catalogs: Data Sheet No. 6-100 (4 pages) shows standard TV cameras; also one for use when noise levels are a hazard. No. 6-103 (8 pages) describes closed-circuit TV equipment. *Cohu Electronics, Inc.*

61—Interchangeable Type. Typists can now change type faces easily on standard or electric typewriters. Bulletin No. R8964.5 (12 pages) tells why type symbols and formulas are a "must" in such fields as electronics. *Sperry Rand Corp.*

62—Data Processing Systems. Three catalogs: CPB-14B (8 pages) covers data accumulator for inspection of tinplate. CPB-22 (8 pages) describes gage logging system. CPB-4A (4 pages) shows a-c network analyzer. *General Electric Co.*

63—Electronic Computer. Here's a 6-page catalog (S-26R1) that discusses a general-purpose digital computer. Gives specs, illustrates components, lists applications. Describes operation of control panel, other info. *Royal McBee Corp.*

64—Marking Machines. This illustrated 8-page catalog (No. 227) presents advantages of machine that prints and code-punches tags and tickets in single operation—fast. Explains principle of automatic data processing. *Dennison Mfg. Co.*

a marker for every purpose—
*AMERICAN and *OLD FAITHFUL MARKERS

Whether you're marking hot steel or the finished product . . . or metal drums or shipping crates—there's an American or Old Faithful Marker scientifically designed to meet your specific requirements for strength, durability and legibility.

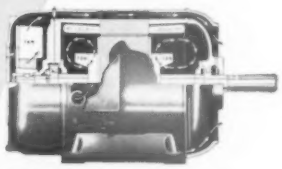
On sale at leading mill supply and hardware dealers everywhere!

THE AMERICAN CRAYON COMPANY
SANDUSKY OHIO NEW YORK

Circle 607 on Reader Service Card

FOR PROVEN ECONOMICAL POWER

AIR COOLED Custom Built . . . NOT Custom Priced



VALLEY
BALL BEARING MOTOR

Here's real power, custom built to fit your every requirement. Totally enclosed — fan cooled — polyphase 50 or 60 cycles — constant speed — squirrel cage induction — high torque — low starting current — enclosed ball bearing.

Send for complete details Today.

VALLEY ELECTRIC CORPORATION
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Circle 608 on Reader Service Card

4000 cartons shipped without one fastening failure since changing to stapling

Heavy shipments of steel stamping dies—letters and figures—leave Young Bros. Stamp Works for destinations all over the U. S. and Canada. Shipping weight is up to 225 pounds per carton. Cartons are securely fastened with 20 Bostitch wide-crown staples.

4000 cartons have been shipped since changing to stapled containers from nailed wooden crates. Not one fastening failure was reported.

Sealing these cartons with the Bostitch D14 wide-crown stapler is three times faster than nailing wooden crates. Packing costs are approximately one-third as much. In addition, shipping charges are down because of reduced tare.

A Bostitch Economy Man helped Young Bros. find these competitive advantages in their shipping room. An Economy Man will gladly work with you to locate savings in time and money now hidden in yours. There is no obligation whatsoever. He's listed under "Bostitch" in your telephone directory. Call him or mark and mail the coupon for information.

Fasten it better and faster with

BOSTITCH®
STAPLERS AND STAPLES

Bostitch, 604 Briggs Drive, East Greenwich, Rhode Island

Please send me literature on the use of Bostitch equipment in the shipping room.

We ship _____ (Kind of product)

We now ship in _____ (Kind of container)

Our containers are fastened with _____ (Fastening method)

Name _____

Firm _____

Address _____

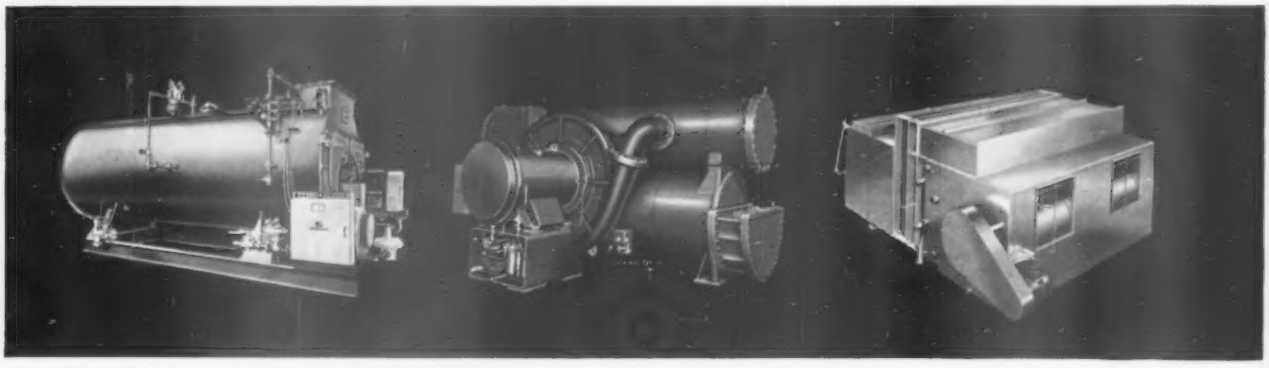
City _____ Zone _____ State _____

To serve you better we created a new division

Now you can benefit from the combined engineering backgrounds and product lines of three American-Standard* divisions—American Blower, Ross Heat Exchanger, and Kewanee Boiler—consolidated into *one* organization!

Here is *one-source* responsibility for quality and performance in equipment that is designed, engineered, and manufactured to work together. You draw from a product line unsurpassed in the industry . . . one that encompasses air conditioning, heating, ventilating, heat transfer, dust collection, and fluid drives.

There are engineer-staffed offices in all principal cities to work with architects, consulting engineers, and contractors with equipment selection and on-the-job problems. Send for Bulletin B-5829 for facts about the new: American-Standard Industrial Division, Detroit 32, Michigan. In Canada: American-Standard Products (Canada) Limited, Toronto, Ontario.



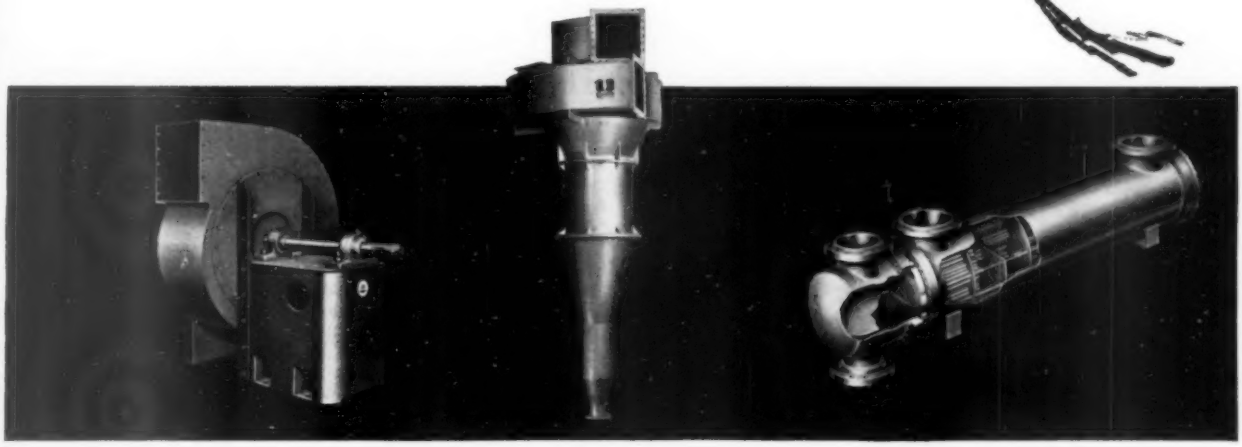
Firebox, scotchtype steel boilers and package units for heat, power, steam.

Centrifugal refrigerating machines for central-station air conditioning.

Central-station air-conditioning units for public buildings, industrial plants.

AMERICAN-Standard
INDUSTRIAL DIVISION

AMERICAN BLOWER • ROSS • KEWANEE



Industrial fans with wheel types for handling air, gases, materials, shavings.

Dust collectors for recovering valuable materials, eliminating nuisance dust.

Heat exchangers, condensers, and feed-water heaters for every requirement.

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Today, with the big wage talks just ahead, you're hearing a lot about productivity. Here's the true story on this crucial statistic and what it means to plant operating men. Plus a briefing on how to measure productivity in your own plant. All together, it tells . . .

Blunt Questions

Q. Why aren't we doing better?

A. Our average gain of 3.3% per year since 1945 is good—but breaks no records. Obviously the billions we've spent on plant and equipment to date aren't enough. Lots of industry still needs modernizing.

Q. How useful are national productivity figures?

A. Not much use in the plant. The national figures could be moving up when yours are going down. The real question: What is *your* trend?

Q. Why should wages and national productivity figures be linked?

A. There's no compelling reason at all. No "law" of economics. But it does simplify collective bargaining —if that's what you want.

What Every Operating Man Should

OUTPUT PER MAN-HOUR has been rising at a high rate since the end of World War II. The rate is 3.3% per year for the 12-year period 1945-1957, compared with a rate of 2.4% for the past 60 years, and 2.6% for the past 40 years.

This statement should make you feel good. But before you get too enthusiastic, here are a few additional facts to consider:

- The 3.3% figure, though good, doesn't set any records. Productivity authority Solomon Fabricant, of the National Bureau of Economic Research (NBER), New York, points out that we have had other periods of similar length in our earlier history that have been just as good.
- The postwar period has been a record period of technological progress, in which we have heard much of automation and mechanization. Despite this, we have set no productivity records, though we have admittedly done well. This suggests a question: How can we get a bigger payoff from the hundreds of billions of dollars we have spent to date on new plant and equipment? The answer: Stepped-up modernization. A lot of industry needs it. According to the McGraw-Hill Department of Economics, for example, the cost to replace today's obsolete facilities and equipment in manufacturing plants is $35-billion.
- A lot depends on how you define productivity and how you measure it. If you use another measure than output per man-hour, one developed by John W. Kendrick of NBER, you get a shock. He calls his measure "Total Factor Productivity." With it he combines the two big factors in productivity—capital and labor—to produce a measure of "output per unit of labor and capital combined."

When you use Kendrick's measure, you find our rate of progress in the past 12 years has been no better than for the past 40: an average increase of 2.1% per year in both cases. (This is better than the 60-year average of 1.7%, but doesn't make our post-war performance look like anything to shout about.)

By M. J. MURPHY
Chief Editor, FACTORY

NEEDED: A LOOK BACK

Men like Fabricant and Kendrick are serious students of productivity and recognized authorities on the subject. They make no effort to take sides or to judge whether the trends they trace are good or bad. Yet their data suggest that it might be worth our while to take a closer look at some questions about productivity that have current importance.

Technology and productivity—One of these questions we have examined—whether technological progress automatically yields higher productivity (column 1). With the measures of productivity now available, it is clear that the answer is no.

Wages and productivity—In 1948 General Motors and the United Auto Workers Union negotiated their now-famous productivity contract. In it they provided for an automatic annual improvement increase of 2½% per year. The 2½% figure was selected because it was the long-term rate of increase in national output per man-hour. The reasoning was that workers were thus being re-

. . . and Frank Answers on the Vital Problem of Productivity

Q. Can unions make their case—that gains in real wages have lagged behind gains in productivity?

A. Yes. National figures on "real" wages don't count fringe benefits—a very big part of wages today. If they select the right years and play down the fringe benefits, they can make their case.

Q. Can management make a case for the argument that wages have risen faster than productivity?

A. Yes. The NAM points out that between 1945 and 1956 wages increased twice as much as productivity.

Q. What goes on here? They both can't be right.

A. Yes, they can—if you let 'em pick the years and the figures (all correct) that they want. But the nod must go to management on the argument. "Real" wages are unreal in this day of fringe benefits, pensions, and the like.

Q. Is growing productivity endangering our ability to give work to our growing labor force?

A. In manufacturing, yes. It will be some time in the 1960's before we again reach the 17.5-million we employed in 1953. But this is being offset by growing employment in finance, service industries, and government. Even in the recession these took on more employees.

Q. Isn't the 4-day week the logical answer to lagging employment in manufacturing?

A. Absolutely not. Any time we can make an economic case for the 4-day week, let's have it. But we certainly can't today. In our present economy the 4-day week would become just a spread-the-work idea, something like putting a limit on the bricks a bricklayer lays.

Q. What's wrong with having fewer people turning out more products in your plant?

A. Nothing wrong—and never has been. In fact, the manufacturer who starts easing up on efforts to improve productivity will find himself a dead duck. His competitors will see to that. And don't forget—economists agree that growing productivity is essential if we expect to enjoy a rising standard of living.

Know About Productivity

warded in proportion to their part in the growth of productivity.

Is this sound reasoning? It's hard to say, and whatever is said won't alter the fact that by now, according to the Bureau of Labor Statistics (BLS), there are some 180 union contracts covering some 4-million workers that call for productivity raises in some form.

One thing is fairly clear: Whether sound or not, the idea of an annual adjustment would have historical support if the total amount of adjustment were limited to 2½%. The reason: The average rate of increase in real hourly wages over the past 60 years has been just about equal to the average annual rate of increase in output per man-hour.

As a matter of fact, the workers would have come out somewhat ahead. That's because statistics on real wages don't count the many fringe benefits that have become so common in recent years.

But, of course, the 2½% adjustments called for in contracts of the General Motors type don't stop there. Different contracts vary in detail. But most also provide for so-called cost-of-living adjustments, plus improvements in fringe benefits such as pensions, insurance, vacations, holidays, supplementary unemployment insurance.

Despite these additional sums, union economists can—and do—make a case for the proposition that workers are being short-changed. They point to the better-than-3% rate of increase in output per man-hour since World War II. And since productivity figures vary greatly from year to year, they can even show much larger percentages for the right combination of years over short periods of time.

Arguing in the other direction, management spokesmen can make a strong case. The National Association of Manufacturers has been able to show that total pay per hour increased over twice as fast as output per man-hour between 1948 and 1956. The NAM's case would have been even stronger had it included another year's figures—1957, for instance, when manufacturing productivity increased only about 1%.

But arguing over such questions is not getting at the heart of the real problem. It's this:

Is there any compelling reason why companies and unions should make national productivity statistics the guidepost for wage changes? (Aside, that is, from the obvious advantage that it simplifies collective bargaining.) Since the majority of unions and employers still seem to resist accepting the idea, there is clearly no unanimity on the subject. And there certainly are no "laws" of economics that call for such an arrangement. The answer therefore is no—there is no compelling reason for relating wages to productivity statistics.

Employment and productivity—The key question here is: Is the higher productivity rate of the postwar period cutting down on our capacity to keep our growing labor force at work? Since 1960 will see 50% more young people than usual (the "war babies") entering the labor force, this is obviously an important question.

The McGraw-Hill Department of

How the Experts Measure Industrial Productivity

Best-known sources of information on productivity are the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor and a private organization in New York City, the National Bureau of Economic Research (NBER).

Most productivity figures you hear quoted are BLS figures of Physical Output per Man-Hour or Net Output per Man-Hour. BLS has been producing these two sets of figures in various forms for many years. In published form they are index numbers, not true output numbers. Reason: Such numbers enable you to combine a variety of figures that otherwise couldn't be reduced to a common base. In addition, what everyone wants to know is per cent increase in output per man-hour from year to year. The index numbers make it simple to figure these changes.

Until recently the man-hour figures used by BLS covered production and related workers only. This ruled out supervisors, proprietors, and almost all white-collar and office workers. In a new series of figures published last year, BLS enlarged its man-hours definition to cover all employees. Thus BLS recognizes the importance of our growing white-collar population (up 50% in manufacturing in the past 10 years, while production workers rose only 3%).

As used by BLS, physical output is the gross production of a plant, in units. Net output is the dollar value added to products by the manufacturer in his own plant. In other words, it subtracts the cost of raw materials, purchased parts, depreciation, etc., from the total value of the gross output.

During recent years, NBER has gone beyond BLS and introduced several important new productivity measurement ideas. The key men in this work have been John W. Kendrick and Solomon Fabricant.

- The first new idea is a measure of "output per weighted man-hour." The weights NBER uses for man-hour figures reflect differences in average hourly earnings for different occupational groups. It reasons, logically, that higher-paid workers contribute more to productivity than do lower-paid. The engineer contributes more than the sweeper.
- The second new idea is a measure of "output per unit of tangible capital." This is a clear departure from the labor-productivity thinking that has so long prevailed. It gets at the fact that investment in land, plant, equipment, and inventory is an important productivity factor. In effect, computation is the same as for any other measure: You divide total value of land, equipment, etc., into gross or net output. You can also add a weighting factor.
- The third new idea is the logical outgrowth of the first two: an index that combines both labor and capital. Kendrick calls this "Total Factor Productivity." He feels it is the best available measure of changes in productivity because it is the only one that reflects the combined influence of both labor and capital on output. Since both factors are obviously important, his argument is impressive.

How do these three new measures compare with one another? Here is a brief summary:

	Average Annual Rate of Increase in Productivity (1899-1953)
Net output per unweighted man-hour (equivalent to new BLS measure)	2.3%
Net output per weighted man-hour	2.0%
Net output per unit of weighted tangible capital	1.1%
Net output per weighted unit of labor and tangible capital combined ("Total Factor Productivity")	1.7%

If you want to learn more about these new measures, see: Solomon Fabricant, "Basic Facts on Productivity Change," Occasional Paper 63, National Bureau of Economic Research, 261 Madison Avenue, New York 16; price, $1.

Economics recently made a study of our current lagging manufacturing employment. In that report Economist Douglas Greenwald makes this comment:

"The clear implication of the contrasting figures on production and employment is that productivity in manufacturing—in terms of output per man-hour of labor—has risen substantially in recent months. In commenting on a similar rapid increase in productivity during the 1954-55 recovery period, we ventured to predict: 'In the absence of a major war, continuing rises in productivity may prevent manufacturing employment from again reaching the 17.5-million of August 1953 for at least a decade.' So far, this prediction has proved correct."

This phenomenon of lagging manufacturing employment after a recession is not new. It has shown up in each of our three recessions since the end of the war. But the recovery has been slower each time. Greenwald expects it will be at the earliest some time in 1960—some 20 months from the bottom of the recession—before manufacturing employment returns to the 1956-57 high level of about 17-million.

So much for the short-term situation and our current employment and unemployment problems. Nobody can state precisely how much of the employment lag is due to rising productivity. But you can be pretty certain that some of it is.

NEEDED: A LOOK AHEAD

Greenwald has suggested that it will be several years before we get back to the employment levels of 1953 in manufacturing. He thus anticipates a continuation of the impact of rising productivity.

Since our average postwar increase of 3.3% a year in output per man-hour is far from spectacular, this continued slow growth of manufacturing employment poses some serious questions. What if we finally get a big payoff from our heavy investments in equipment over the past years? What will happen, for example, if productivity rates double for three or four years?

And what is likely to develop if organized labor continues to be as successful as it has been in the past in negotiating large wage increases? Is it probable that higher wages will lead to greatly increased effort by manufacturers to mechanize operations—and thus employ even fewer workers?

Turn the page

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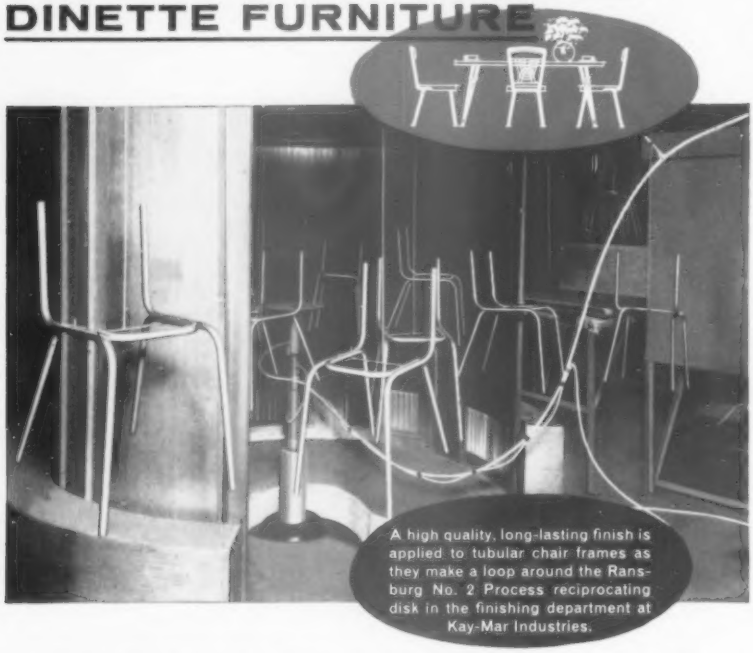

A high quality, long-lasting finish is applied to tubular chair frames as they make a loop around the Ransburg No. 2 Process reciprocating disk in the finishing department at Kay-Mar Industries.

● Kay-Mar Industries, Cassopolis, Michigan, switched from the dip method to Ransburg Electrostatic Spray Painting because they wanted to improve the quality of the finish on their metal furniture line.

Now, with electrostatic spray painting, they get a heavier, more uniform application, which was not possible with former dip. With electrostatic, they are able to use metallic coatings with higher metal content. In their magazine advertising to the mobile home industry, they proudly say: "Finest finish in the industry at no additional cost to you!"

Electrostatic provides other advantages at Kay-Mar. They picked up some additional—and much needed—floor space when dip tanks were removed. Their insurance rates were reduced because of improved "housekeeping" conditions. Frequent color changes are made quickly and simply, and rejects—which used to run 1½%—are reduced to less than a quarter of one per cent.

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Let us test prove the advantages of automatic electrostatic spray painting on your products in our complete laboratories. No obligation. Call or write for our No. 2 Process brochure, which shows a variety of automatic painting installations on a wide variety of products. Or, if your production doesn't justify automatic painting, let us tell you about the new Ransburg No. 2 Process electrostatic hand gun, now widely used by both large and small manufacturers.

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These questions defy simple answers. Merely saying "Let's have a 4-day week," as many will say, is no answer. Nor is any other simple share-the-work kind of solution.

One thing is certain: The manufacturer who eases up in his own in-plant efforts to continue to improve his productive efficiency will be making a serious mistake. Economists can't put precise numbers on this, but you will find few of them indeed who won't agree that growing manufacturing productivity must be accompanied by jobs in trades, services, even government.

Greenwald sums up this situation in these words: "Meanwhile, employment opportunities continue to expand in most industries other than manufacturing, mining, and agriculture. During the recent recession the over-all drop in non-agricultural employment, excluding manufacturing and mining, was only 2%, and most of this decline centered in contract construction. Employment actually rose, despite the recession, in finance, service industries, and government. Over the long run it is to these areas—rather than to manufacturing—that we must look for increasing jobs to absorb a growing labor force."

NEEDED: SURE MEASURES

So the need to keep on improving productivity is still with us, and will stay with us. One way to improve it is to learn more about measuring it, especially at the plant level.

How practical is it to set up your own system of productivity measurement for your own plant? The answer can run all the way from quite practical to impossible.

One well-known economist advises: "Tell your readers to stay away. They have measures like unit costs and standard hours, and that's all they need."

Another economist, hearing this, retorted: "Pay no attention. By all means encourage your people to try a hand at productivity measurement at the plant level."

So you can take your choice. Our own feeling, after digging into the matter fairly deeply, is that even an unsuccessful stab at a measurement

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Vacu-Break® switch units provide maximum safety, too. Arcs are smothered quickly inside compact Vacu-Break chambers. Pitting and burning of contacts are reduced to an absolute minimum — maintenance is virtually eliminated.

The Clampmatic® spring assembly inside the Vacu-Break chambers assures clamped-pressure contacts, speeds "break", increases switch life. For safety's sake, lower cost and speedier installation buy BullDog Vacu-Break Unit-Versal Switchboards.

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Begins on page 246

system in your plant can be worthwhile. You'll quickly learn what's involved. You'll qualify, by comparison with almost everybody else, as an expert. That alone isn't a bad thing at a time when productivity is on everyone's lips.

Measuring the easy way—Under just the right conditions, you can measure productivity quite easily. Unfortunately, these conditions are not too common.

The principal requirement is that you have a plant where you can keep a good record of output in terms of physical units rather than dollars. If you can get such a record, you have a chance of comparing one year with another fairly simply. Keep in mind that the whole point of productivity measurement is tracing changes from year to year—showing the trend. This means the real question isn't whether you can get usable figures for any one year. It's whether you can get figures that you can legitimately compare over a period of years.

As soon as you shift from physical units of production to dollars in measuring your output, you will discover that you have to go into the statistics business in a big way. That's because dollars and prices change from year to year. To get comparable figures, you have to correct for inflation according to the value of the dollar in some base year. This can be done, but it is certainly no easy operation.

Here are a couple of examples of the kind of plant that permits easy comparison of physical output figures, without "deflation":

- A chemical or food plant that specializes in a single product. Here you can use pounds or gallons or tons of output as your basic measure. You can divide by man-hours or machine hours or equipment hours —or by any other "input" that's important to you.

As long as you don't change the product, you can thus build up year-to-year comparisons. Doesn't matter if you change process and equipment. After all, that's the main way in which you improve productivity.

- A high-production fabricating or assembly plant that specializes in a very small number of products, each

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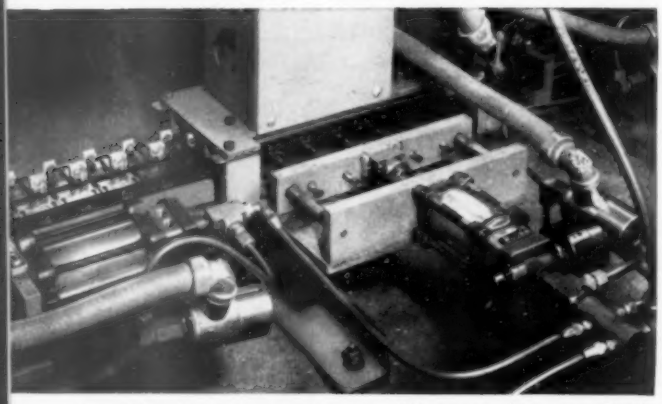
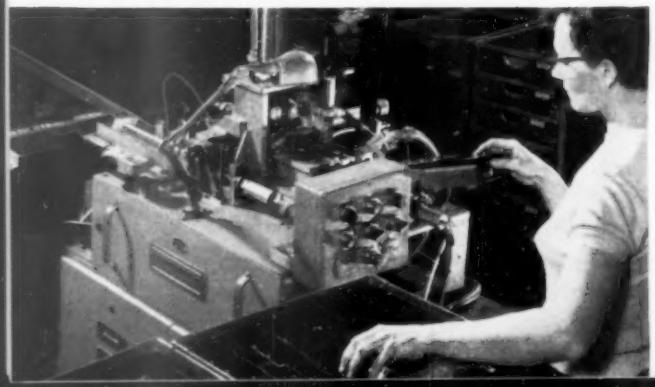
1. CALIBRATION In a dust-free room, where temperature is maintained at a constant 75°, operators calibrate *every* Pushmatic bi-metal assembly on a special optical viewer. Each bi-metal "latch" is adjusted to a dimensional accuracy of 1/1000 of an inch. Prior to this, the bi-metal had been heat-treated in an inert atmosphere to relieve stresses, "normalize" the metal.



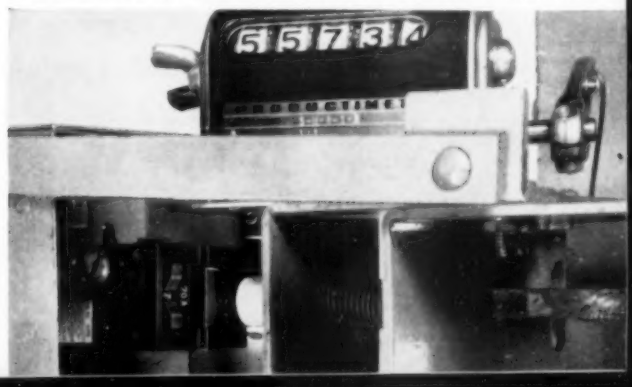
2. MECHANICAL BREAK-IN After assembly every Pushmatic is operated 50 times to make absolutely sure it functions well mechanically. Ten break-ins would be adequate . . . the extra 40 give you that much more assurance that it will never fail in manual or automatic operation.

3. CALIBRATION UNDER LOAD Brought back to its "set" temperature, each breaker is checked at 200% of rated current, and again at the equivalent of 125% of rating. Check Boards are accurate to 1/10 of a second. Samples from each production run are also tested at 100% of rating.

4. SHORT CIRCUIT TEST Being thermal-magnetic devices, Pushmatics then undergo severe short circuit currents to test the instantaneous trip time of the magnetic element. If a breaker fails to trip within .02 seconds, it is automatically rejected by the machine. Extra safety, extra performance.



5. ENDURANCE TEST Underwriters' Laboratories run periodic endurance tests on BullDog Pushmatics®. The requirement — 10,000 operations, 6000 under load and 4000 with no load. But BullDog constantly checks out the breakers at 50,000 or more operations. *End trouble calls. Use Pushmatic!*



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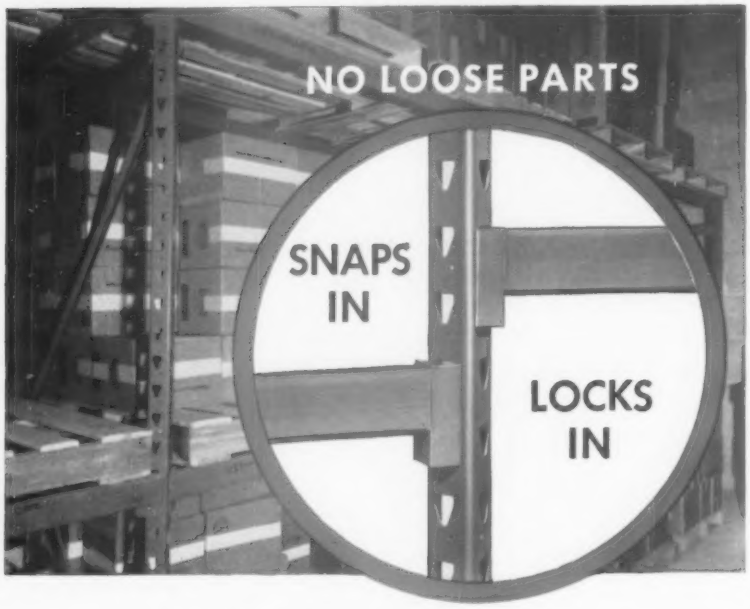

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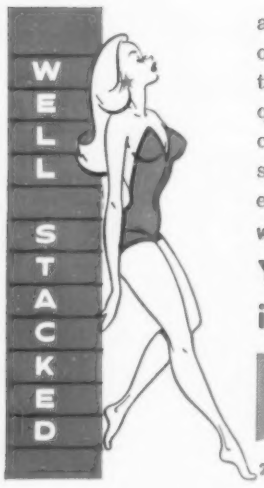

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Begins on page 246

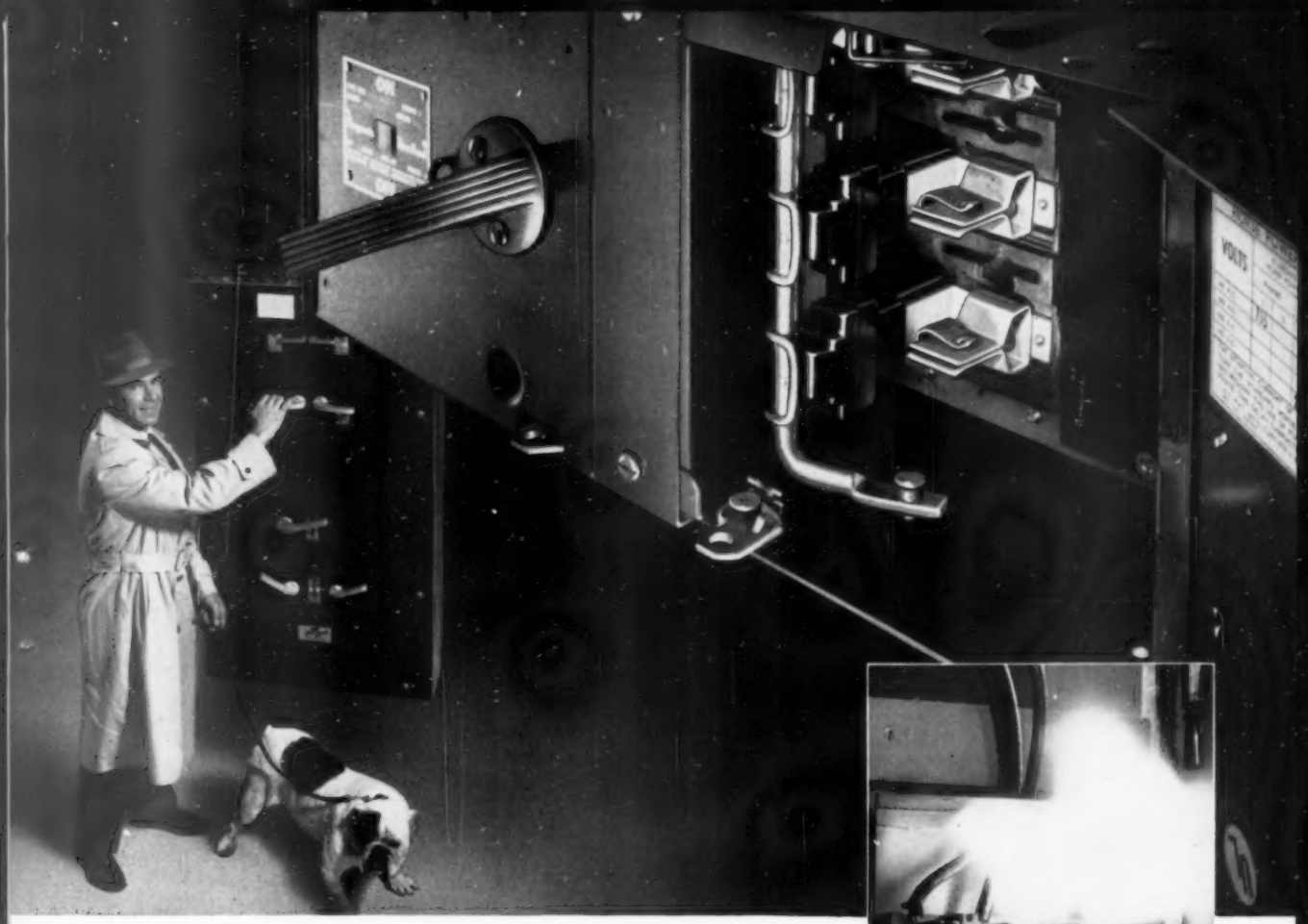
made in large quantities. The number of products must be small because it's difficult to make unadjusted physical comparisons with past years if the product mix varies much from year to year. But if your plant has been pounding out the same product on punchpresses for years, it's obvious that you'll be able to get a pretty good productivity trend for that product.

Notice how restrictive we've had to be in these examples. To measure productivity the easy way, you must stick to physical units of output. That, in turn, means you can't change your product or your product mix. Because as soon as you change, you have to find a common denominator, which is practically always dollars of output. And, as we have already pointed out, that step introduces the headache of correcting for inflation as well as correcting for product improvement.

Measuring the hard way—Don't give up yet, if the idea of getting some kind of measure of productivity still appeals to you. With a little outside help and a litttle cooperation from your accounting department, you can have it. It will be similar to the "net output per man-hour" figure produced by BLS (see page 248 for description of this measure and others).

You'll need from accounting, for the years you want to cover, total man-hours worked by all employees and "value added in manufacture." Accounting probably already has these value-added figures because the Census Bureau asks for them in its periodic Census of Manufactures. They are your gross output in dollars less the cost of such things as depreciation, raw materials, supplies, fuel, power, and the like. You may not get these figures for each year, but that's not important. Just be sure you get enough of them to build up a trend from, say, 1948 or 1950 up to date.

Right at this point (assuming you now have your figures) is where you can use outside help. Find an economist who knows something about making index numbers. Why? Because that's what you're really shooting for—a set of index numbers of your plant's output per man-hour,



Dangerous flash explosion occurs at instant of "break" in open knifeblade switch . . . causing blades to burn, pit, deteriorate. (This photograph and the one below are unretouched.)

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Here are some basic facts why BullDog Power Panels with Vacu-Break* units are tops in safety and performance. Vacu-Break design minimizes destructive arcs because contacts are housed in compact chambers that extinguish the arcs immediately. Result: maximum safety . . . virtually no pitting or burning of contacts . . . minimum maintenance. Vacu-Break switch units are "quick-make, quick-break" with an interlocking safety mechanism. Contacts are *directly* attached to operating handle. No tricky toggles or springs. You get positive, safe switching always. And when the handle is in OFF position, you *know* the switch is *off!*

The Clampmatic* design provides clamped-pressure switching contacts to prevent overheating at these points. Needless heat-generating areas are eliminated because there are no hinged, current carrying parts . . . and all conductors are silvered. BullDog switches also withstand severe fault currents. In recent tests, standard BullDog switches with Amp-Traps** were subjected to a 100,000-amp short circuit current. *They were undamaged!*

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BullDog Vacu-Break chamber smothers arcs before they can cause damage. Both are 100-amp, 600-volt switches, operating under 90-ampere, 440-volt load with 40% to 50% power factor.

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*Vacu-Break and Clampmatic are registered trademarks of the BullDog Electric Products Division. **Amp-Trap is a registered trademark of the Chase-Shawmut Company.

For more facts Circle 617 on Reader Service Card

ONLY
RAMSET

offers over
100 different
powder-driven
fasteners
for specific jobs

Ramset, and only Ramset, offers a complete line of "job-fitted" fasteners . . . guarantees the most economical fastener for every application. Versatile Ramset is the best-known and most widely-used powder-actuated fastening system in the entire maintenance field.

In fastening to steel, concrete or masonry, Ramset tools are easiest to use . . . Ramset austempered fasteners are the best you can buy, and perform where others fail. Find out about the astounding savings . . . the absolute superiority of the Ramset Fastening System. Find your dealer's name under "Tools" in the Yellow Pages or write us direct.

Write for your copy of this handy fastener guide

In addition to powder-actuated fastening, the versatile Ramset System includes Shure-Set hammer-in tools for light fastening, and Ringblaster heavy-duty kiln gun.

Ramset® Fastening System

WINCHESTER-WESTERN DIVISION • OLIN-MATHIESON CHEMICAL CORPORATION
12155-D BEREA ROAD • CLEVELAND, OHIO

256 For more facts Circle 618 on Reader Service Card

corrected for dollar inflation in terms of some base year, say 1950. If you can't find an economist, try your local BLS office.

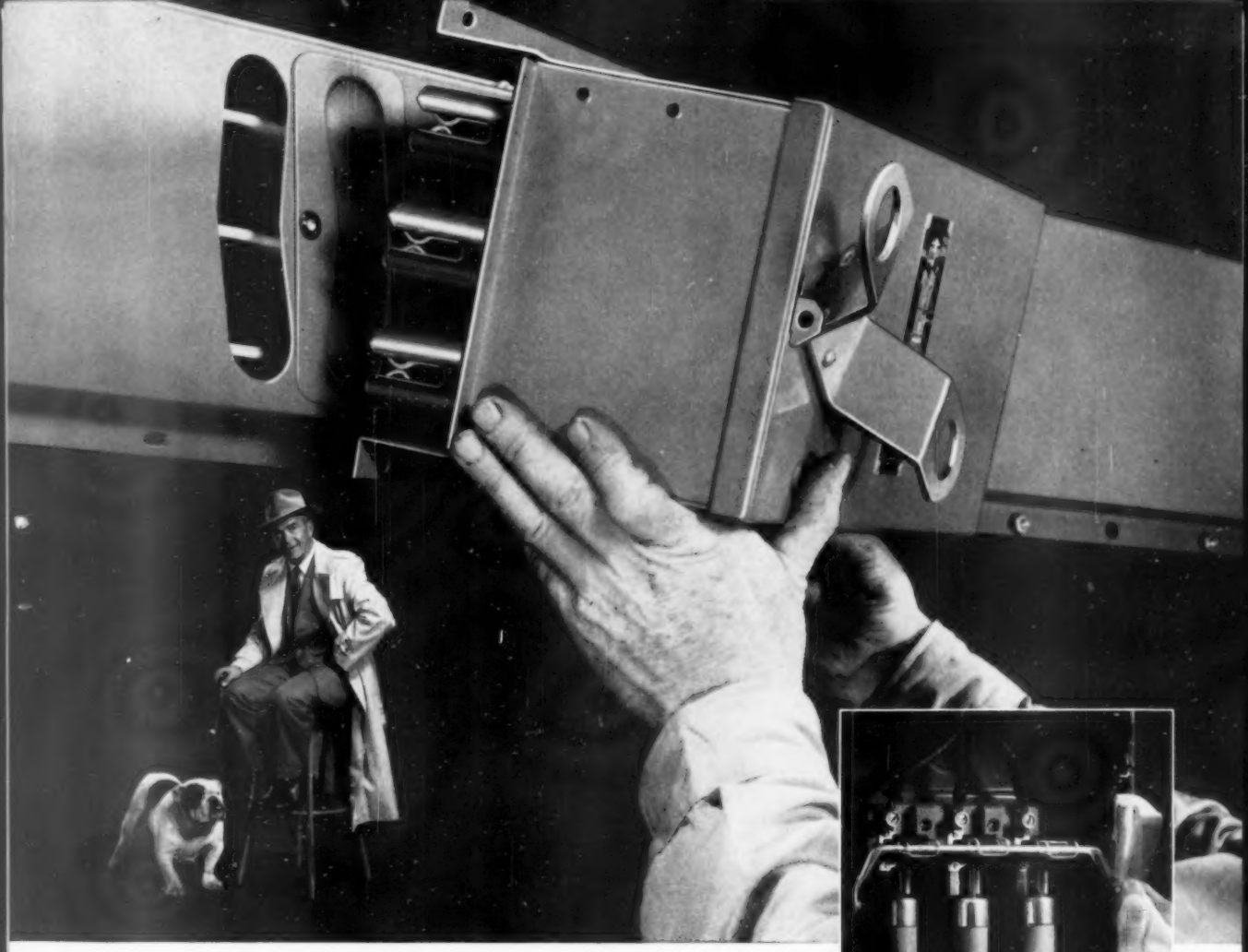
The idea of all this is simple enough. If you divide man-hours into net output for several years, you will end up with dollars-per-man-hour figures. They might look like this: 1950, $2.34; 1951, $2.40; 1952, $2.65. These are all current-year dollars. If you merely put them in the form of index numbers just as they are, you would get something like this (with 1950 as the base year, equal to 100): 1950 = 100; 1951 = 102; 1952 = 113. If the dollar had remained constant in value, you would now be able to say that output per man-hour had gone up 2% in 1951 and 11% in 1952. But you know the dollar hasn't held constant. What you now need is the dollar-correction figure appropriate for your industry for each year (usually based on wholesale prices).

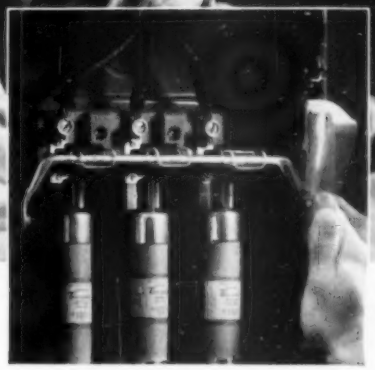
This is an over-simplified example, of course. But though it may be tricky to do, you can see that a simple output per man-hour figure isn't out of your reach. We think you'll learn a lot about your plant and about trend measurement if you give it a whirl.

Coming: "Productivity Accounting"—By now, the thought must have occurred to you that it would certainly simplify matters if your accounting department could just feed you the indexes you need. Accountants have talked about this from time to time. In fact, the principal authority on the subject, Hiram S. Davis, has written a book advocating just that (*Productivity Accounting*, University of Pennsylvania Press, Philadelphia, 1955).

Unless you have some very good and understanding friends in accounting, we suggest you think twice before recommending they shift gears. Even a casual study of Davis's book reveals that adopting a productivity accounting plan could turn out to be a major job.

In time we may come to something like this. But at the moment anyone undertaking it would have to be a real pioneer, facing all the risks and headaches that the pioneer always faces. **END**





Vacu-Break chamber, shown above, smothers arcs at instant of break before they can pit or burn contacts. Dangerous flash explosion occurs at instant of "break" in open knifeblade unit shown below.

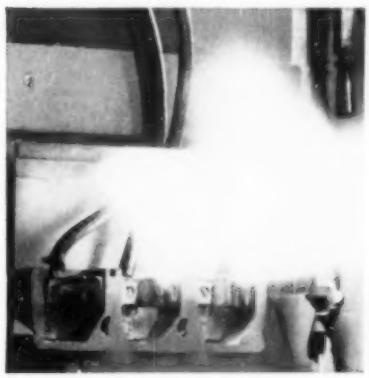
GET VACU-BREAK SAFETY IN BUS DUCT BY BULLDOG

Plug in extra circuits wherever you need them! And do it with complete safety.

BullDog Plug-in Duct provides openings on 20 inch centers on either side of the duct. To tap "live" power you simply insert Vacu-Break® bus plugs. As the picture shows, reinforced fingers on all plugs insure positive pressure contact. Exclusive Vacu-Break action safeguards circuits and personnel. The enclosed arc chamber limits the oxygen supply . . . actually starves the arc before it can explode and pit or burn contacts. (The Vacu-Break bus plug has six companion plugs to meet other applications.)

Plug-in Duct is powered by Lo-X feeder duct—together they form BullDog's integrated BUStribution® system. Both ducts are available in standardized and interchangeable straight sections, elbows, tees and crosses . . . can be installed sideways, on edge, vertically or horizontally.

Do away with rewiring, downtime and costly production shutdowns! Specify *Bus Duct by BullDog.*



BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

Hand the friendly AM man your casualty insurance "headaches" —and forget them!

You can put away the aspirin the day the AM sales representative goes to work on your insurance problems.

For he has both the genuine interest and the know-how from experience to take care of your company's complex insurance needs. Whether it's Workmen's Compensation, Liability or Group A & H—he can plan just the right amount of coverage for each exposure to loss—eliminating loopholes and overlapping.

Backing him up to give you the best insurance protection at the lowest possible cost are other AM service specialists: Production-minded Safety Engineers to cut down costly accidents . . . Claims Representatives (coast-to-coast) to handle cases quickly and fairly . . . Medical Specialists to help the injured recover faster and return to work sooner. To all these cost-cutting services add the savings opportunities through regular AM dividends (policyholders received nearly $8,500,000 in 1958).

Now you can understand why so many companies have handed the *friendly* AM *man* their casualty insurance "headaches".* Why don't you! American Mutual, Dept. F-4, Wakefield, Mass.

***Keasbey & Mattison Company,** another AM policyholder who profited through good safety experience, saved $441,386 in 8 years (difference between manual rates for this industry and rates actually paid) . . . gained another $78,500 through AM mutual dividends.

Your friendly AM man can advise you on all your liability insurance needs

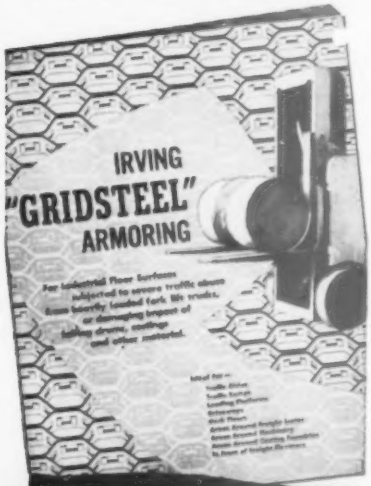
American Mutual

LIABILITY INSURANCE COMPANY

A leading writer of Workmen's Compensation, all forms of Liability, Crime, Accident and Health Insurance

For more facts Circle 620 on Reader Service Card

YOURS for the ASKING!



20 PAGE COLOR CATALOG

on

FLOOR ARMORING

describes how

IRVING GRIDSTEEL

VIRTUALLY ELIMINATES DAMAGE TO YOUR FLOORS

caused by

- HEAVY TRAFFIC
- IMPACT LOADS
- SKIDDING
- VIBRATION

and other Forces

MAIL COUPON TODAY!

IRVING SUBWAY GRATING CO. Inc.
5026 27th ST., LONG ISLAND CITY, N. Y.
Please Send Me Your Gridsteel Catalog

Name..... Title.....

Company.....

Address.....

IRVICO

IRVING SUBWAY GRATING CO., Inc.
Originators of the Grating Industry

Offices and Plants at
27th St., LONG ISLAND CITY 1, N. Y.
10th St., OAKLAND 23, CALIFORNIA

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

PRODUCTION

346—Electric Drills. New catalog gives complete specifications on full line. Albertson & Company, Inc.

347—Screwdrivers. Catalog 5927-T has specifications for either suspension or pistol grip. Aro Equipment Corp.

348—Schedule Board. Bulletin X-500 shows applications of visual control schedule board. Graphic Systems.

349—Controlled Air Devices. Complete idea file with wiring diagrams, installation data, etc. The Bellows Co.

350—Solvent Degreasing. Free booklet, "Solvent Degreasing, a Valuable Industrial Process." Detrex Chemical Co.

351—Pillow Blocks, Bearings. Bulletin A 670 gives detailed information on complete line. Dodge Mfg. Corp.

352—V-Belts. New bulletin (V-227) gives complete data on custom-made V-belts. Flexible Steel Lacing Co.

353—Temperature Control. Application data sheets for temperature control tanks, vats, processes. Fenwal, Inc.

354—Link V-Belting. Catalog No. 1725 describes link-type V-belting that can be joined by hand. B. F. Goodrich Co.

355—Hydraulic Rams. Catalog No. 25 has info on hydraulic rams. Capacities 4 to 60 tons. Hein-Werner Corp.

356—Hydraulic Pipe Benders. Catalog No. 35 on benders for pipe, conduit & tubing (⅜ to 8 in.). Hein-Werner Corp.

357—Flexible Tubing. New book on interlocked and high-pressure tubing. Penna. Flexible Metallic Tubing Co.

358—Speed Indicators. Catalog 148-H gives full information on surface speed indicators. Jones Motrola Corp.

359—Mist Control. Detailed descriptive literature on mist control unit for machining operations. Aget Mfg. Co.

360—Heat Exchanger. Bulletin No. 132 gives complete information for temperature control. Niagara Blower Co.

361—Industrial Wipers. Detailed case histories of modern wiping methods and costs. Scott Paper Co.

362—Filters. Technical literature on multi-cartridge filters for industrial fluids. Commercial Filters Corp.

363—Reproduction Materials. Booklet on new Autopositive Paper Translucent reproductions. Eastman Kodak Co.

364—Data Processing. Illustrated Brochure F-2 describes automatic punched-card control. Royal McBee Corp.

365—Shaft Mounted Drives. Bulletin 7100 gives complete data on varied applications. The Falk Corp.

366—Clutches. New catalog lists full line, specifications, performance data, applications. Formsprag Co.

BUILDINGS

367—Lawn Sprayer. Illustrated catalog on mechanized sprayer. Wide range of models. F. E. Myers & Bro. Co.

368—Plant Sites. Illustrated brochure gives complete information. Northern Berkshire Development Corp.

369—Plant Sites. Brochure (112 pages) lists 123 cities and 424 current plant site areas. State of Minnesota.

370—Roof Ventilators. Bulletin FM-2345 gives application information on ventilators. Buffalo Forge Co.

371—Rolling Steel Doors. Catalog G-59 has details on manual, mechanical, electrical types. R. C. Mahon Co.

372—Buildings. Complete literature on commercial and industrial buildings (in color). Stran-Steel Corp.

MAINTENANCE

373—Visible Record Systems. Data on record system for preventive maintenance. Acme Visible Records, Inc.

374—Plastic Steel. Free bulletin describes properties and gives application information. Devcon Corp.

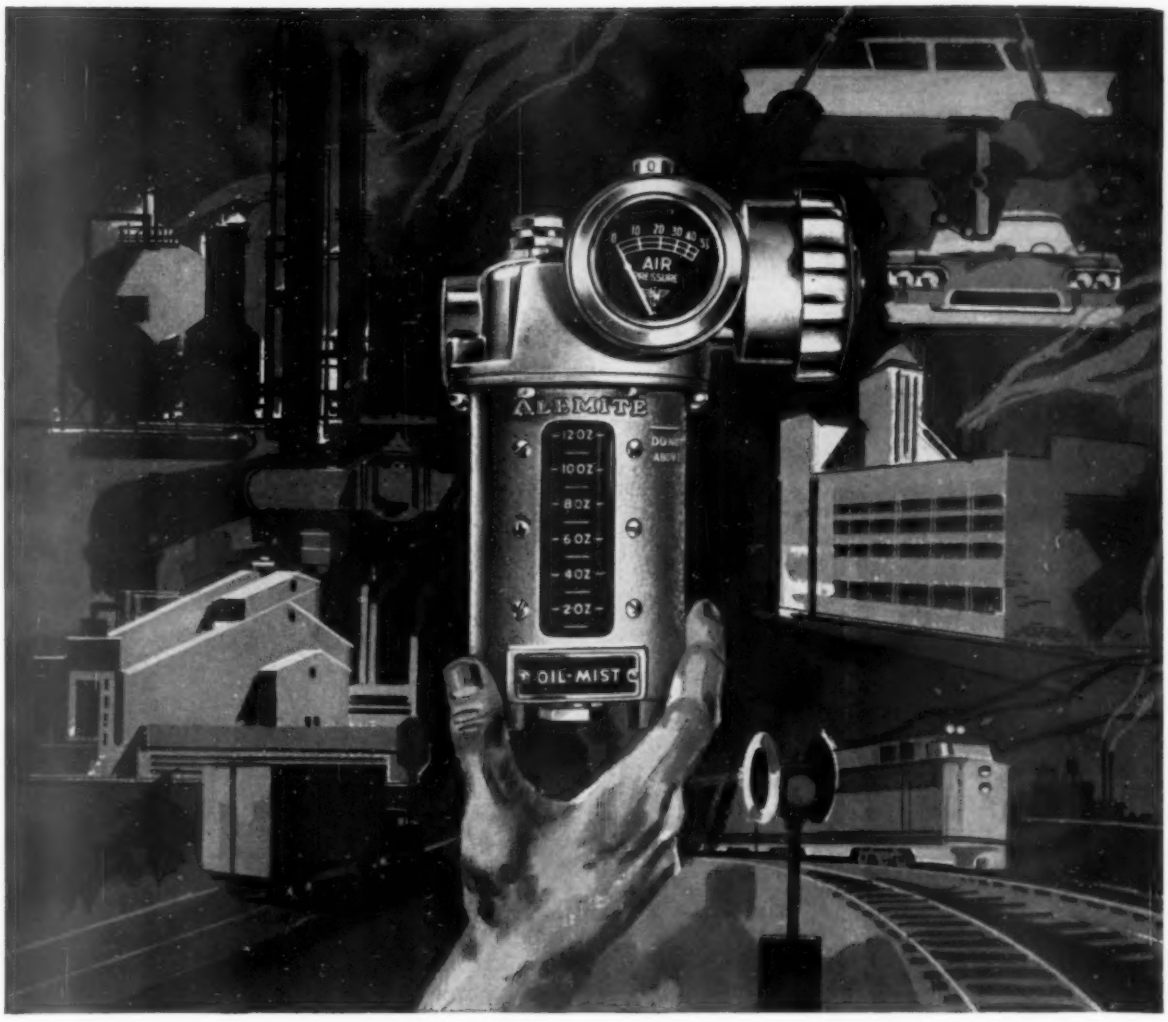
375—Steel Bars. Booklet (24 pages) tells how to make own repair parts quicker and easier. La Salle Steel Co.

376—Lubricants. Free data book gives useful treatise on lubrication. Lubriplate Div., Fiske Brothers Co.

377—Work Platform. Circular tells about telescoping aluminum work platform. Up-Right Scaffolds, Inc.

378—Scrubber-Vacuum. Literature describes complete line of combination machines. Finnell System, Inc.

Turn the page



WHY 500 BLUE CHIP COMPANIES LUBRICATE COSTLY MACHINERY WITH ALEMITE OIL-MIST SYSTEMS

An Alemite Oil-Mist Lubrication System provides safe, foolproof, automatic lubrication . . . increases machine output . . . reduces lubrication costs.

Designed for a wide range of applications. Oil-Mist provides constant, uniform lubrication of many sizes and types of bearings, from small sewing machine bearings to large steel mill back-up roll bearings or work roll bearings. Open type and enclosed gear trains and chain drives are lubricated by Oil-Mist when leakage problems exist. An Oil-Mist System is also ideal for lubricating slides, ways and cams, where a minimum of continuous lubrication is required.

Used in both large and small plants. Alemite Oil-Mist Systems are now operating in hundreds of plants . . . reducing operating temperatures and bearing wear . . . eliminating housekeeping problems and contamination due to over-lubrication . . . reducing man-hours and down-time. Check *your* plant. Perhaps you, too, can benefit from the many important advantages of a modern Oil-Mist System.

Cut costs . . . reduce man-hours and machine down-time . . . extend bearing life . . . increase production . . . with a modern Alemite Oil-Mist Lubrication System

Write today for free Oil-Mist catalog!
Dept. E-49, 1850 Diversey Parkway, Chicago 14, Illinois

Symbol of SW Excellence

ALEMITE DIVISION
STEWART-WARNER CORPORATION

For more facts Circle 622 on Reader Service Card

TORIT DUST COLLECTION ENDS THIS:

"OUT OF PRODUCTION FOR THREE DAYS? THAT'S WHEN WE'RE SUPPOSED TO SHIP!"

"And believe me, that wasn't all the boss said! Two key machines were so clogged with dirt and grime we had to disassemble and clean them—overnight! Between overtime for the repair crew and our own crew, I managed a partial shipment in three days. And I made up my mind this wasn't going to happen again!

"I'd heard of preventive maintenance with Torit Dust Control equipment—and the Torit representative I called sure opened my eyes! Clean machines hold close tolerances better and up to 80% longer! Torit collectors remove over 99% of dust and air-borne debris, save on both the cost and frequency of servicing.

"I expected there'd be a hitch on prices—but look what I found out: our production breakdown cost nearly as much as the Torit equipment we needed! And just while Torit Dust Collectors are being depreciated we'll make money on them—through maintenance savings, improved production, and reduced down-time!

"The boss actually congratulated me when I showed him the savings Torit preventive maintenance gives us!"

Torit Dust Collectors stop dust build-up before it costs you money. They're available in both high efficiency cyclone and cabinet type units. Why not check into them today—write:

TORIT manufacturing company

ADVERTISERS' LITERATURE

Begins on page 260

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

379—Lubricants. Booklet gives information on new type multi-purpose lithium base grease. Gulf Oil Corp.

380—Lubricants. Free literature on all-purpose grease for all types of bearings. Sinclair Refining Co.

381—Paint. Booklet (28 pages), "How to Put Color to Work," gives color hints. E. I. du Pont de Nemours & Co.

382—Lubricants. Trouble-shooting chart to spot and cure common hydraulic system troubles. Sun Oil Co.

383—Lubricants. Free: "Management Practices that Control Costs via Organized Lubrication." Texas Co.

384—Rust Preventive. Complete literature, with applications and color charts, is available. Rust-Oleum Corp.

ELECTRICAL

385—Sealed Motors. Bulletin PB-6000-2 gives pertinent facts about enclosed motors. Elliott Co.

386—Bus Duct. Bulletin 3-125 gives detailed data on new low impedance duct. Federal Pacific Electric Co.

387—Motors. Literature describes complete line of enclosed, fan-cooled a-c motors. Brook Motor Corp.

388—Drum Switches. Publication 6091 lists full details on reversing drum switch line. Allen-Bradley Co.

MATERIALS HANDLING

389—Storage Racks. Full literature on drive-in or drive-thru type storage racks. American Metal Products Co.

390—Cranes. Bulletin on single girder motor-driven cranes with detailed mechanical features. Abell-Howe Co.

391—Stand-up Rider Tractor. Bulletin 588 describes new model electric towing tractor. Barrett-Cravens Co.

392—Magnetic Materials. Comprehensive facts on magnetic separation, vibration equipment. Eriez Mfg. Co

393—Staplers, Tackers. Bulletin FT-50 gives complete information and application data. Fastener Corp.

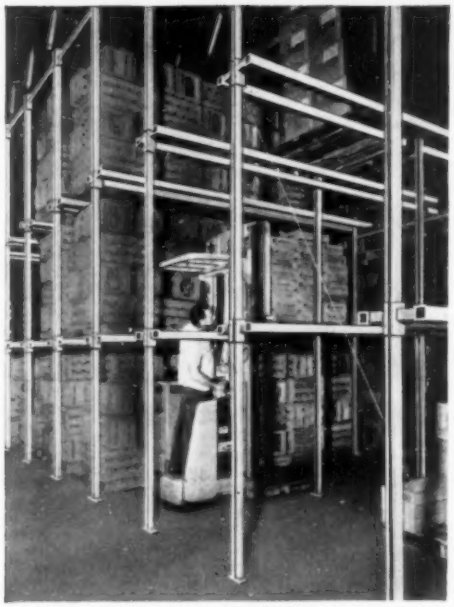
394—Corrugated Boxes. Detailed literature available on new moisture-resistant boxes. Hinde & Dauch Co.

Turn the page

American

Drive-In or Drive-Thru

STORAGE RACKS



Any fork truck can drive directly into storage area to load or unload, the American way.

Sturdy, load-carrying stringers are made of rugged square tubing from one end of a row to the other.

make non-productive AISLE SPACE productive storage space

Cut storage labor cost — get more storage space for your dollar — by going American. American "Drive-Thru" Racks are open at both ends for trucks to travel all the way through, giving fast, efficient, first-in, first-out load handling. American "Drive-In" Racks can be used against wall for maximum space saving, or can be spaced from wall so trucks can enter from either end. American Racks are designed to meet mass storage problems. American, trigger-quick, slide-n-lock stringers make adjustability an easy matter. Write today . . . let us tell you more about how you can make non-productive aisle space productive storage space.

send for literature

AMERICAN METAL PRODUCTS COMPANY

STORAGE RACK DIVISION

5959 Linsdale Ave. amp Detroit 4, Michigan

For more facts Circle 624 on Reader Service Card

IT WOULD TAKE UP TO

7 Men with 7 Brooms

TO KEEP UP WITH THIS

NEW POWER SWEEPER!

COMPACT design and easy steering make the new Tennant Model 53 Power Sweeper ideal for fast and efficient sweeping of both congested and open areas.

● Riding this new TENNANT Power Sweeper and cleaning a 40" path on the run, one man can sweep *3 to 7 times faster than is possible by hand!*

Combined brush-and-vacuum system of the new TENNANT "53" instantly removes chips, sand, debris, dirt and dust that push-brooms can't pick up.

Starts, stops, reverses instantly *without hand shifting.* Easy to use, easy to buy . . . often pays for itself in 9 to 14 months!

WRITE TODAY *for illustrated bulletin, photos and performance data. G. H. Tennant Co.,' 705D N. Lilac Drive, Minneapolis 22, Minnesota.*

OUTSTANDING "53" FEATURES

- Sweeps 40" path (with sidebrush)
- Toe-tip shifting leaves both hands free for steering
- Has front wheel drive, rear wheel steer. Turns in 5' radius
- Works easily in congested areas
- Powerful vacuum, large filter gives extra-clean sweeping
- Both gas and LP-gas models

TENNANT

Industry's Most Widely Used

POWER SWEEPERS

Model 100 Sweeper cleans 7'4' path

Model 80 Sweeper cleans 53' path

Model 40 Sweeper cleans 34' path

SPECIALIZED MAINTENANCE EQUIPMENT

ADVERTISERS' LITERATURE

Begins on page 260

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

395—Scales. New catalog on dial scales gives specifications for standard and special types. The Howe Scale Co.

396—Screw Conveyors. Data Book 2289 gives full data and installation features of this line. Link-Belt Co.

397—Industrial Locomotives. New literature describes features. Weights up to 40 tons. Rogers Bros. Corp.

398—Conveyors. Bulletin No. 64 on custom-planned conveyor systems with handidrive. Standard Conveyor Co.

399—Electric Truckster. Illustrated booklet covers half-ton capacity heavy duty truck. Cushman Motors.

400—Cranes. Covers mechanical features of cranes with capacities to 10 tons. Euclid Crane & Hoist Co.

401—Steel Shelving. Catalog gives complete information and mechanical features. Borroughs Mfg. Co.

402—Wire Rope Slings. New sling handbook gives types, dimensions, weights, rated loads. Union Wire Rope Co.

403—Staplers. Literature gives details on the use of stapling equipment in the shipping room. Bostitch, Inc.

404—Lift Trucks. Brochure 5230 lists complete line of lift trucks for varied applications. Yale & Towne Mfg. Co.

405—Material Carriers. Specification Folder GMC gives facts and figures on these carriers. Towmotor Corp.

406—Magnetic Pulleys. Complete literature on permanent non-electric magnetic pulleys. Eriez Mfg. Co.

PLANT SERVICES

407—Fluorescent Lamps. Free booklet. "How to make lighting a better tool for profits." Sylvania Electric Co.

408—Abrasive Tread Plate. Application, design, fabricating data on non-slip tread plate. Aluminum Co. of America.

409—Fire-Retardent Paints. Detailed illustrated descriptive literature and data on line of paints. Alim Corp.

410—Plug Valves. New lubricated plug valve catalog (PV-5) contains complete information. Wm. Powell Co.

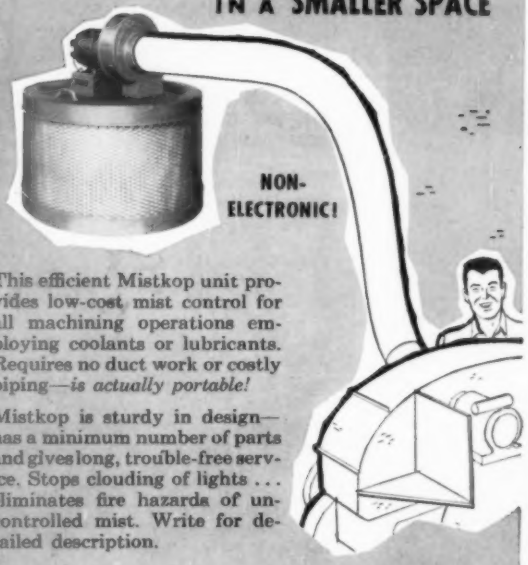
411—Paper Towel Dispensers. Free bulletins cover controlled roll paper towel dispensers. Steiner Co.

Turn the page

MISTKOP

STOPS MIST

COLLECTS MIST-FOG EFFECTIVELY IN A SMALLER SPACE



This efficient Mistkop unit provides low-cost mist control for all machining operations employing coolants or lubricants. Requires no duct work or costly piping—*is actually portable!*

Mistkop is sturdy in design—has a minimum number of parts and gives long, trouble-free service. Stops clouding of lights . . . eliminates fire hazards of uncontrolled mist. Write for detailed description.

AGET Manufacturing Company
1410 Church Street • Adrian, Michigan

For more facts Circle 626 on Reader Service Card

PAINT ON FIRE PROTECTION!

Photograph taken during a full-scale demonstration of **Säf** fire retardant paints at the largest United States Air Force base in the Eastern Air Defense Command. Building in foreground was painted with **Säf** and ignited under identical fire-load conditions at the same time as building in background.

Säf stops all fires

These are some of the extreme fire-hazard areas which can be made safe . . . with Säf Fire Retardant Paints:

• BASEMENTS • CELLARS • BOILER ROOMS • STAIRWELLS • HALLWAYS • CORRIDORS • DOORS • EXPOSED STRUCTURAL STEEL • GYMNASIUMS • KITCHENS • CAFETERIAS • ATTICS

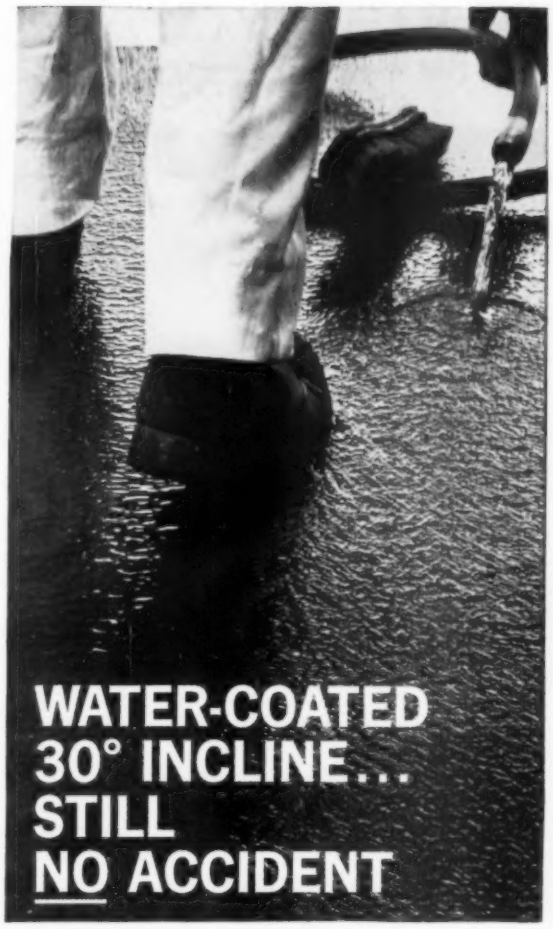
—STOPS FLAME SPREAD — INSULATES — DECORATES

FIRE RETARDANT PAINTS

Write for full, illustrated descriptive literature and technical data (including Underwriters' Laboratories ratings):

Alim Corp., 11 Park Place, New York 7, New York
National Sales and Service
Baltimore Paint and Chemical Corp. Manufacturers

For more facts Circle 627 on Reader Service Card



WATER-COATED 30° INCLINE... STILL NO ACCIDENT

Get Long-Life Protection Against Slipping with Alcoa Abrasive Tread Plate

A slick, water-soaked surface in a vital production area with heavy traffic has all the elements of a safety director's bad dream. Only Alcoa® Aluminum Abrasive Tread Plate prevents such a nightmare. Made with tough particles of fused aluminum oxide, it remains slip-proof even when wet, oily or greasy. It prevents costly slipping accidents that can injure workers, cause production breakdowns and higher insurance rates.

Find out how you can eliminate hazardous conditions on ramps, aisles, catwalks and other areas with easy-to-install, corrosion-resistant Alcoa Abrasive Tread Plate. Check the coupon below, write Aluminum Company of America, 1687-D Alcoa Building, Pittsburgh 19, Pa., or call your nearest Alcoa Distributor.

ALCOA ALUMINUM

Your Guide to the Best in Aluminum Value

For Exciting Drama Watch "Alcoa Theatre," Alternate Mondays, NBC-TV, and "Alcoa Presents," Every Tuesday, ABC-TV

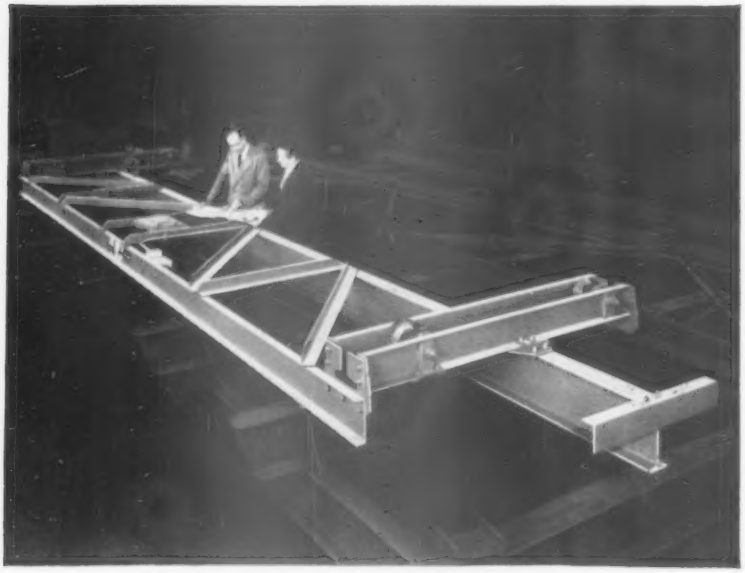
Aluminum Company of America
1687-D Alcoa Building, Pittsburgh 19, Pa.

I'd like to see how Alcoa Abrasive Tread Plate prevents slipping.
Please send me FREE sample—also application, design and fabricating data.

Name_____
Title_____
Address_____
City_____ State_____

For more facts Circle 628 on Reader Service Card

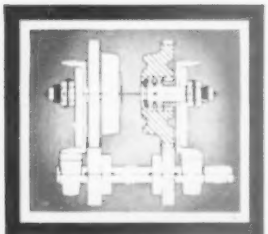
as MAINTENANCE FREE as CRANES can be...



ABELL-HOWE

UNDERHUNG CRANES

NOW WITH FORGED ALLOY STEEL WHEELS, GEARS AND PINIONS



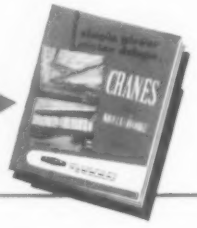
another ABELL-HOWE *plus*

"QUICKLOCK" WHEEL ASSEMBLIES

Combine positive wheel mounting with immediate removability. To remove axle, simply loosen two nuts, twist axle 90° and pull it out. Wheels, too, are as easily removed with no dismantling of truck frame. "QUICKLOCK" is exclusive with Abell-Howe.

Only Abell-Howe offers you forged steel dependability at all critical points of wear—wheels, gears *and* pinions! Furthermore, Abell-Howe rugged outrigger construction keeps bridge in square—provides lateral bracing for bridge girder. Smooth fluid drive provides cushioned starts whatever the load—reduces reversing shocks. To further assure smooth operation and lasting service, anti-friction bearings used throughout—with double row ball bearings in end truck wheels. Here's crane value that can't be beat!

ASK FOR BULLETIN



ABELL-HOWE COMPANY *7767 W. Van Buren St., Forest Park, Illinois*

ADVERTISERS' LITERATURE

Begins on page 260

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

412—Unit Heaters. Free copy of "Modern Heating" tells how to solve plant heating problems. Reznor Mfg. Co.

413—Grating. This 20-page catalog gives information on "Gridsteel" floor armor. Irving Subway Grating Co.

414—Unions, Fittings. Descriptive brochure on complete line of pipe unions and fittings. The Fairbanks Co.

415—Silicone Based Paints. Brochure gives facts on paints formulated with silicones. Dow Corning Corp.

416—After-Coolers, Separators, Filters. Bulletins 712, 117 have data for compressed air users. R. P. Adams Co.

417—Wall Finishes. Descriptive bulletin on adhesive finish for dull, damp, or damaged walls. Swift & Co.

418—Unplasticized Sheet, Joining Strips. Gives complete information, applications. Colonial Plastics Mfg. Co.

419—Pumps. Bulletin 976-G lists mechanical features and application for single suction pumps. Buffalo Pumps Div.

420—Thermostats. Bulletin T-901 gives complete data for control air, steam, liquids. Johnson Service Co.

421—Steel Equipment. Catalog illustrates widely diverse line of steel equipment. Lyon Metal Products, Inc.

MISCELLANEOUS

422—Machine Mount. Set of "Facts" books gives full data and applications. Unisorb Div., Felters Co.

423—Fasteners. Handy guide lists over 100 different powder-driven fasteners. Winchester-Western Div.

424—Label Printing Machine. Complete data on various types of label printing machines. Weber Marking Systems.

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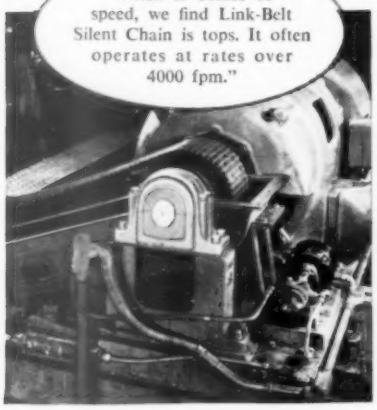

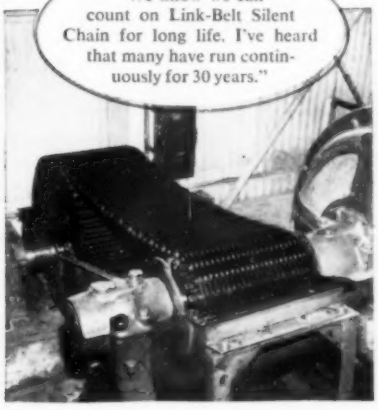

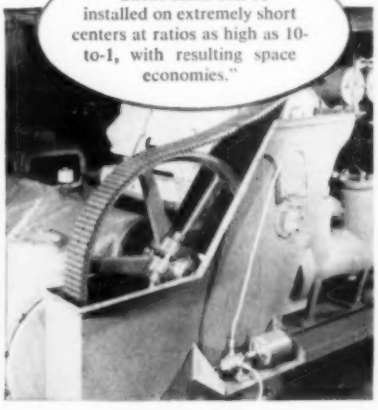

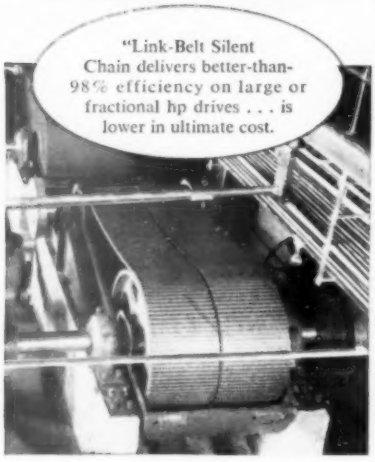

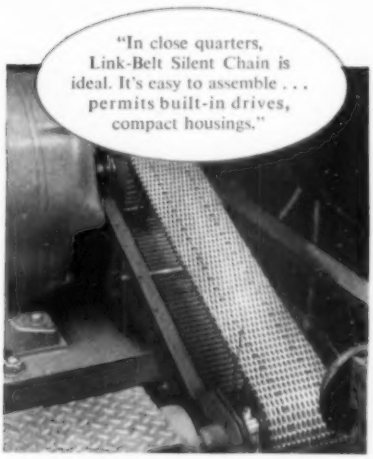

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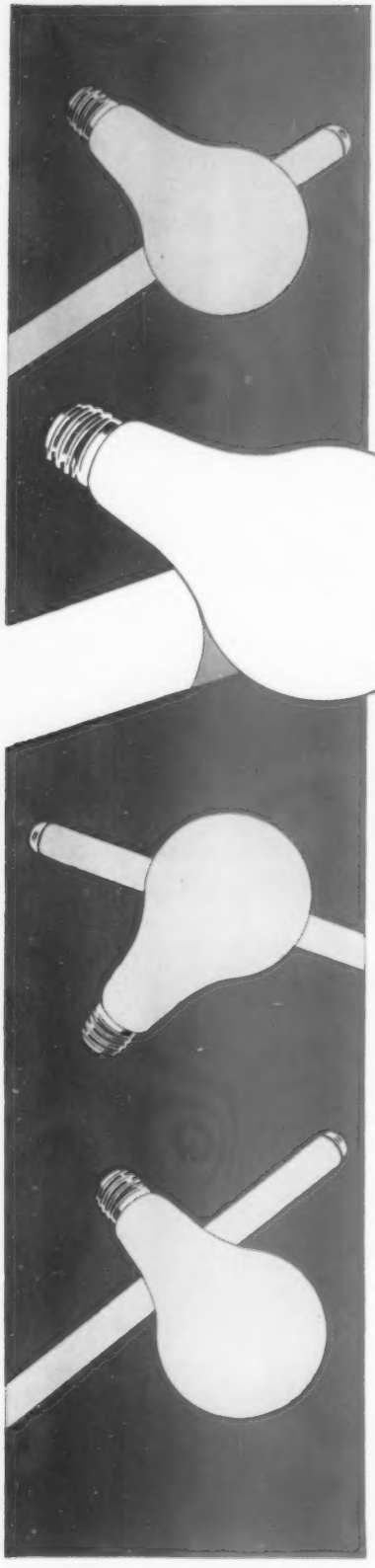

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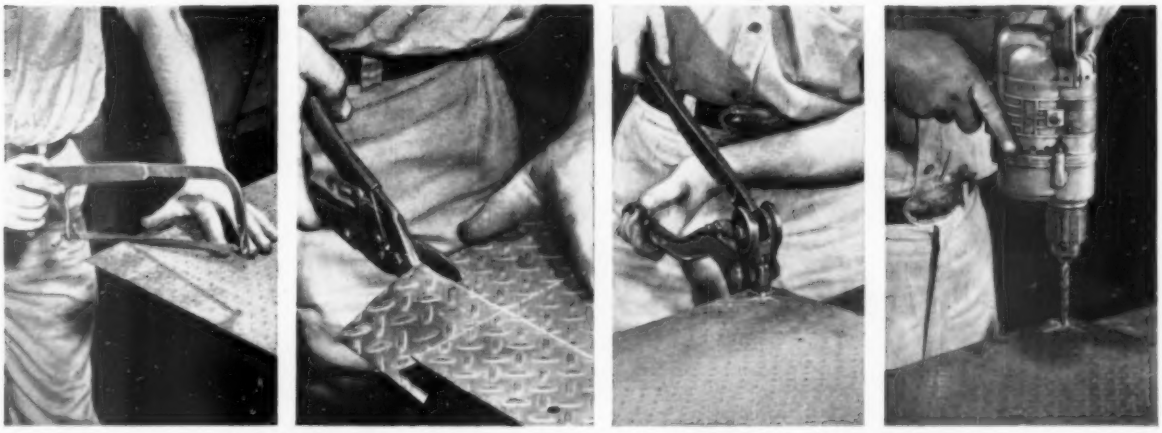

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Here's how it works. Jensen is equipped with a transistorized pocket-size radio receiver. When you want to contact him, you call him by phone. If he's away from his usual location, your switchboard operator sets his *private code signal* on the encoder (a compact unit located next to the switchboard) and flips a switch.

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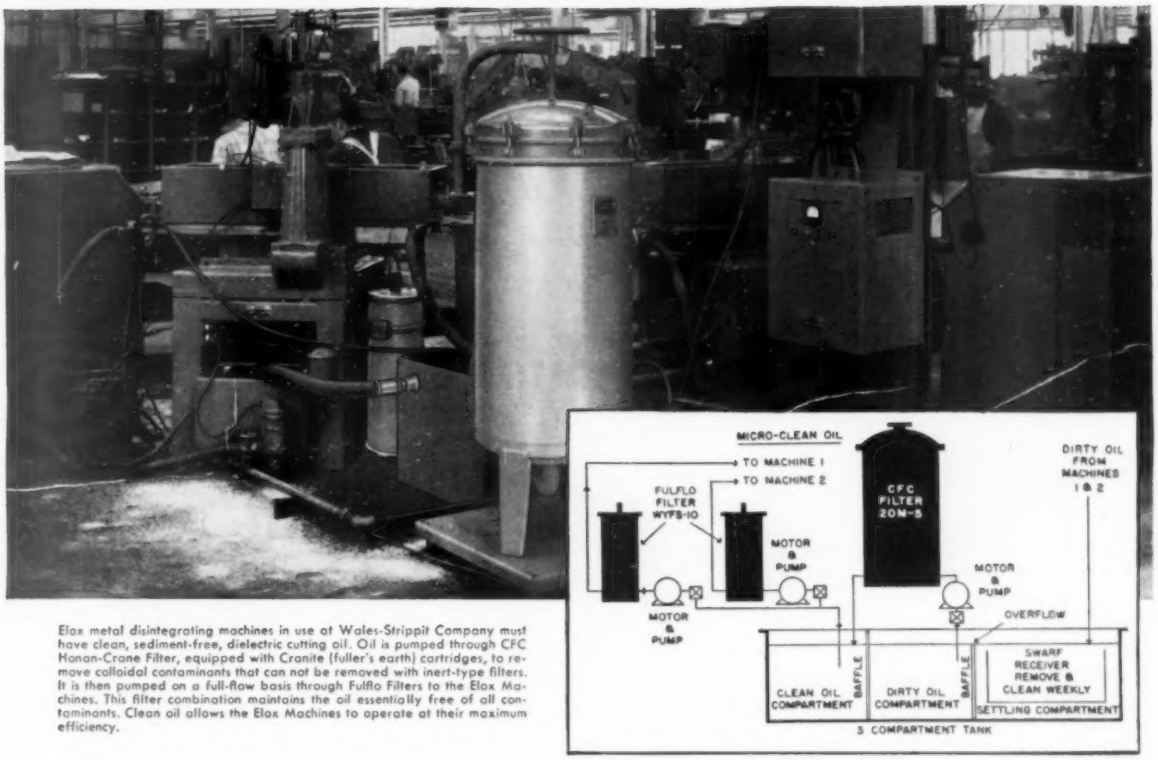

Elox metal disintegrating machines in use at Wales-Strippit Company must have clean, sediment-free, dielectric cutting oil. Oil is pumped through CFC Honan-Crane Filter, equipped with Cranite (fuller's earth) cartridges, to remove colloidal contaminants that can not be removed with inert-type filters. It is then pumped on a full-flow basis through Fulflo Filters to the Elox Machines. This filter combination maintains the oil essentially free of all contaminants. Clean oil allows the Elox Machines to operate at their maximum efficiency.

WALES-STRIPPIT gains 2 production hours per day—per machine—with *Fulflo* and *CFC* Filters

Here's how Wales-Strippit Company solved the problem of costly downtime — and also assured superior quality of holes cut with Elox Disintegrating machines. First, they switched to CFC Honan-Crane Multi-Cartridge Filters with Cranite (fuller's earth) elements. This removes both solid and dissolved impurities to assure micro-clarity. Oil is then fed to the electrode area through Fulflo Filters, with Honeycomb Filter Tubes, to remove any micro-contaminants that may have entered the system after the initial filtration.

Result? Downtime to change filter elements for each machine was reduced from 20 minutes every 3 to 4 hours — to 20 minutes once each week. This saving in downtime permits an extra 2 hours of productive time per machine, per day (for three 8-hour shifts). In addition, micro-clarity of the oil prevents any nicks in the cut surface and enables the machines to hold close tolerances between the electrodes and work areas.

Fulflo Filters provide true depth filtration to any degree of micro-clarity for all types of industrial fluids — oils, liquid fuels, liquid chemicals, compressed air, CO_2 and other gases; for high or low flow rate, pressure, *p*H, temperature, or viscosity. CFC Honan-Crane Filters are designed for bypass application, coolant clarification, magnetic separation, and many other uses.

Send for technical literature or engineering assistance to Department FA

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MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

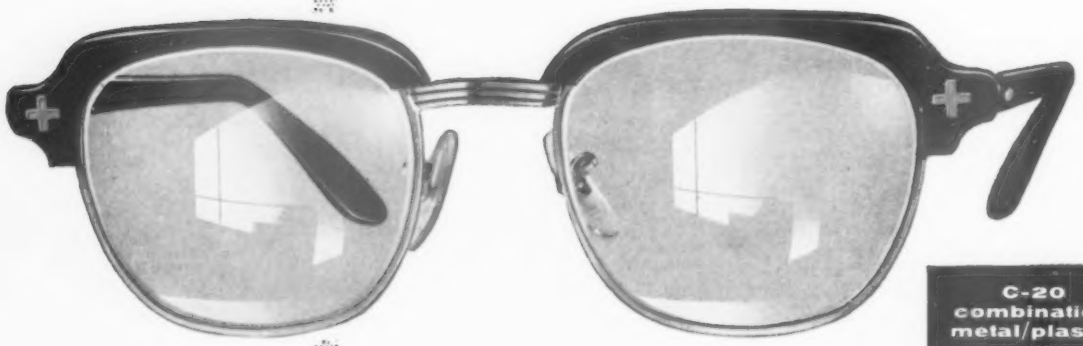
MICRO-CLARITY AT MINIMUM COST

Fulflo Filters — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC Filters — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

Workers go for functional good looks

This new Bausch & Lomb safety frame has got it... PLUS



C-20 combination metal/plastic

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Safety Eyewear

protection+economy+worker acceptance

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Easy way out

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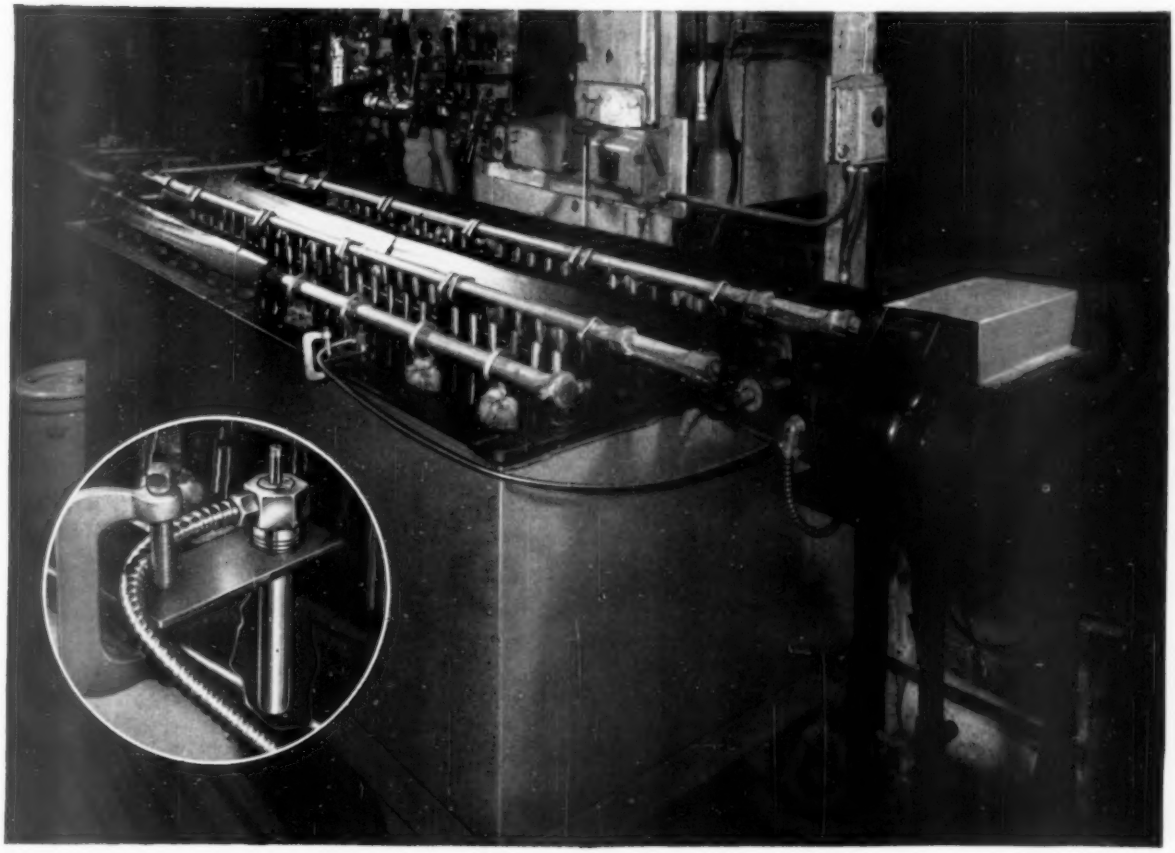
Temperature control of tanks, vats, processes can be handled precisely and efficiently by Fenwal THERMOSWITCH units. Simple to install, completely dependable, they provide control as close as fractions of a degree . . . *at a fraction of the cost of "complicated" controllers!*

Take temperature control of the nickel plating tank shown below. In this application, a simple "over-the-side" hook-up did the trick. However, if more convenient, the same THERMOSWITCH unit could have been screwed into a pipe fitting in the side of the tank. In either case, the result is *rugged, high-precision control with practically limitless life!*

A wide range of immersion and surface mounting type units permits equally effective control under varying space and position requirements. Units are adjustable, resist corrosion, shock and vibration. Cover −100 to 1100°F range. Current ratings up to 10A-115VAC. For complete details, see your Fenwal Distributor. For application data sheets, write Fenwal Incorporated, 254 Pleasant Street, Ashland, Massachusetts.

Here a Series 17100 THERMOSWITCH unit is used, with electrical leads protected by flexible conduit cable. Other available designs include cartridge, flange head, coupling head and junction box. Dial and knob can be added to most types.



ANOTHER EXAMPLE OF HOW **Fenwal** CONTROLS TEMPERATURE . . . PRECISELY

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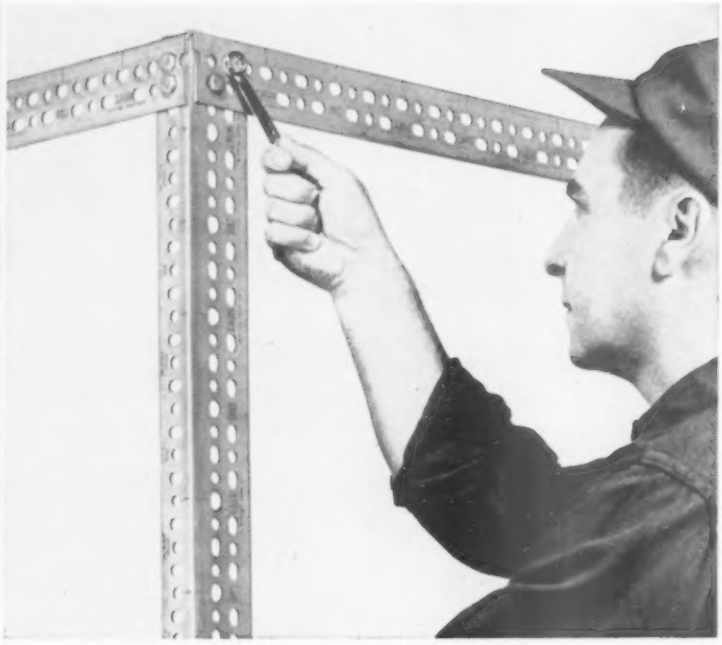
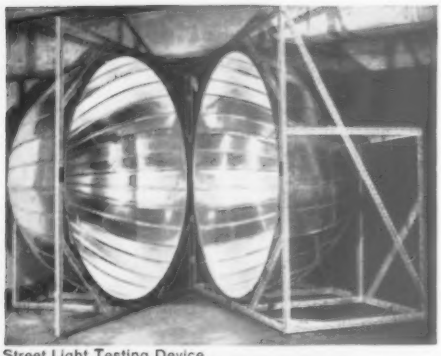
Pallet Racks with Catwalk

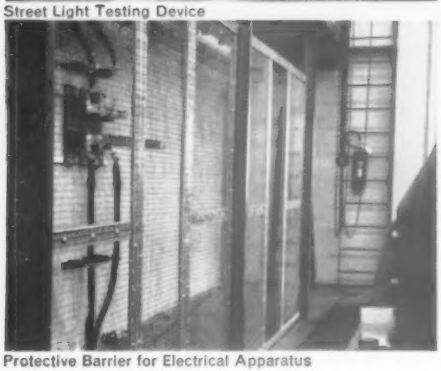
Automobile Display Rack



BUILD IT WITH new AIM BRAND slotted angle



Street Light Testing Device



Protective Barrier for Electrical Apparatus

The Only Framing Material That Gives You Lock-Joints, Friction-Joints, and ⅜" Structural Bolts

Whether you need a common storage frame or an unusual piece of equipment, you can build it faster and more economically with new AIM Brand Slotted Angle. This versatile framing material features a new slot-and-hole bolting pattern that simplifies the assembling of all kinds of durable structures and equipment.

Two bolts fastened through round holes form a Lock-Joint for maximum strength and rigidity. The structural design of mezzanine floors, bar stock racks, etc., permits use of this joint.

Two bolts fastened through slots form a Friction-Joint. This type of joint provides normal rigidity and is used when the structural design of such day-to-day jobs as tables, shelving, etc., permits. ⅜" diameter structural bolts, each with a safe-load capacity of 2000 pounds, are used for all connections.

Cold-rolled galvanized steel, AIM Brand Slotted Angle comes in two sizes: Standard 225-80 (2¼" x 1½" x .080") and Heavy-duty 300-104 (3" x 1½" x .104"). Ten or twelve-foot lengths come in packages of 10 pieces with bolts and nuts.

New AIM Brand Slotted Angle is a product of Acme Steel Company, U. S. pioneers in slotted angle framing material. Available nationally through local distributors or write: Dept. FAD-49, Fabricated Materials Division, Acme Steel Company, 135th Street and Perry Avenue, Chicago 27, Illinois.

ACME STEEL **AIM Brand Slotted Angle** AIM BRAND

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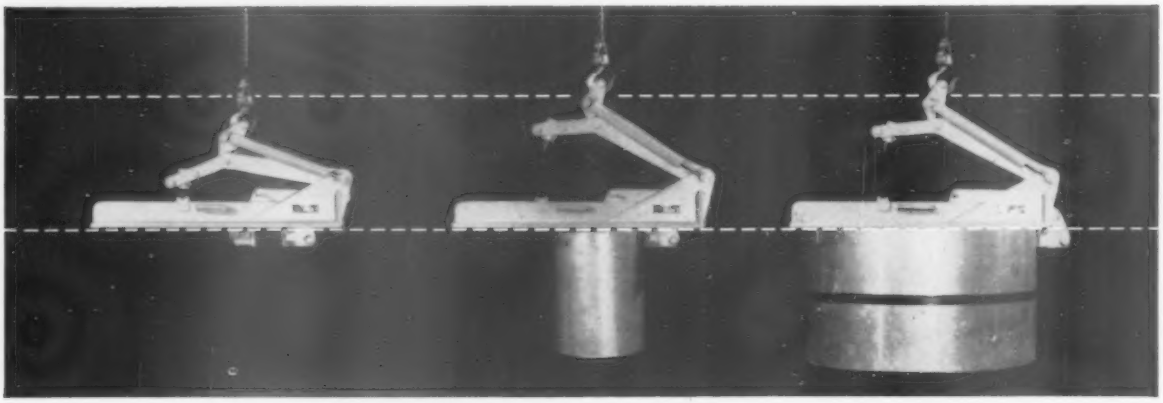
NEW HEPPENSTALL COIL TONGS

stack large and small diameters to within 24 inches of the crane hook



Only two feet high at greatest extension, these new Heppenstall Tongs put more coils into less space, faster. By simple manual adjustments, these tongs handle inside diameters as small as 5 inches and up to 20 inches, outside diameters from 6 to 40 inches, with a 1,000 pound capacity rating. Custom models of this same design will handle coils up to 3,000 pounds. For more information and a quotation, call your Heppenstall Company Representative or send us your load and operating requirements. Heppenstall Company, Materials Handling Division, New Brighton, Penna.

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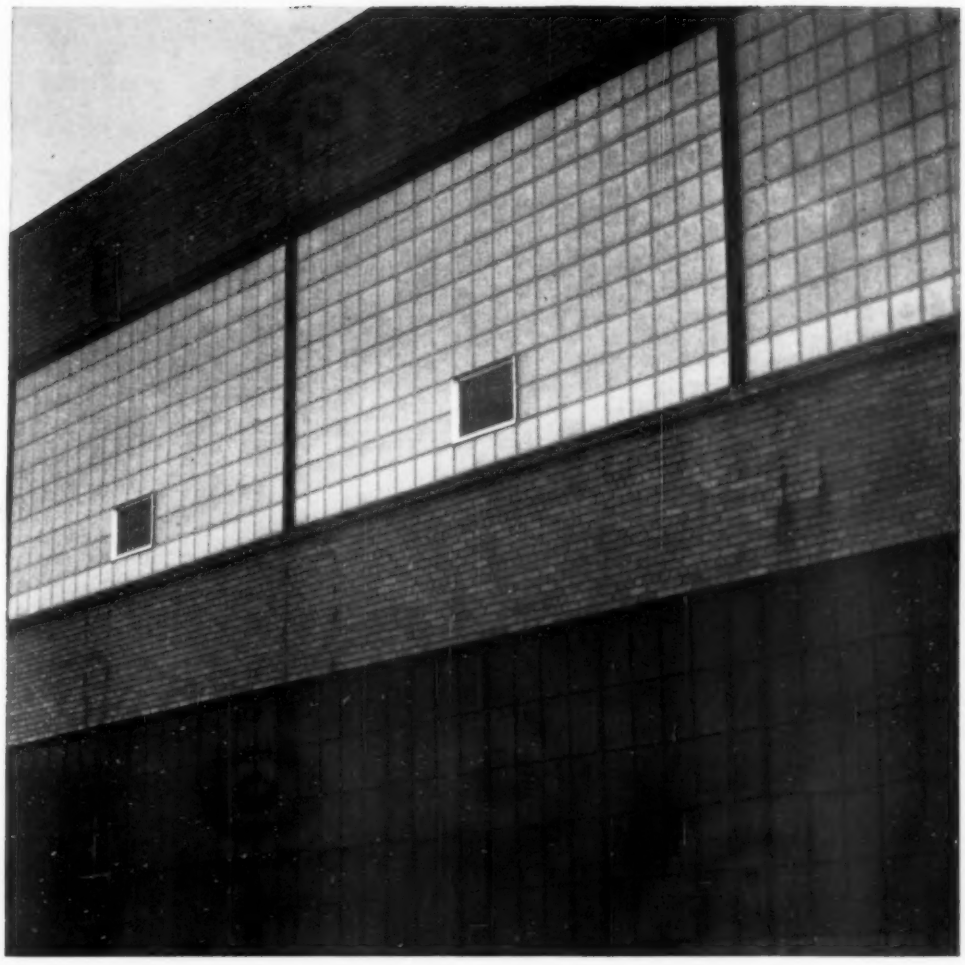
IF IT HANGS FROM A CRANE . . . HEPPENSTALL CAN HANDLE IT

THIS ▸ in place of THIS ▸



for glare-free daylight, good insulation value, low maintenance, improved appearance

Second floor modernized. First floor next. Out comes the existing sash, and in goes the clean sweep of PC Glass Blocks. Why? It makes good sense.

Most sash leaks dust and dirt. Heat seeps through it to cause heat loss in winter, heat gain in summer. Heating-cooling costs go up. The light it admits is harsh, glaring, hard on workers' eyes. And maintenance is costly. Constant painting to prevent rusting. Constant replacement of broken panes. Too-frequent washing.

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When your sash reaches the eyesore stage . . . puts holes in your maintenance budget . . . think of PC Glass Blocks. Keep them in mind for new construction, too. Get details by writing Pittsburgh Corning Corporation, Dept. N-49, One Gateway Center, Pittsburgh 22, Pa.

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. . . quietly stop individual shafts or motors—fast
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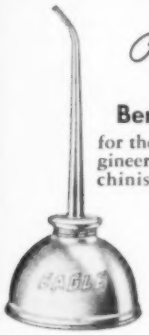

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for home or office use in oiling sewing machines, fans, hinges, typewriters, washing machines, etc.

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keep moving parts of tractors and other large equipment running smoothly . . . flexible, straight or angle spouts.

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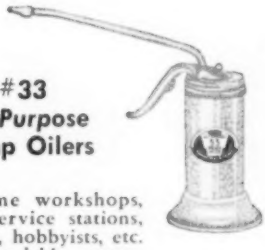
fit holders on practically all farm machines . . . dependable, inexpensive.



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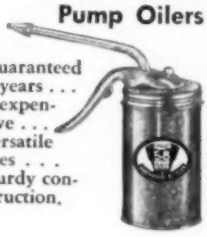

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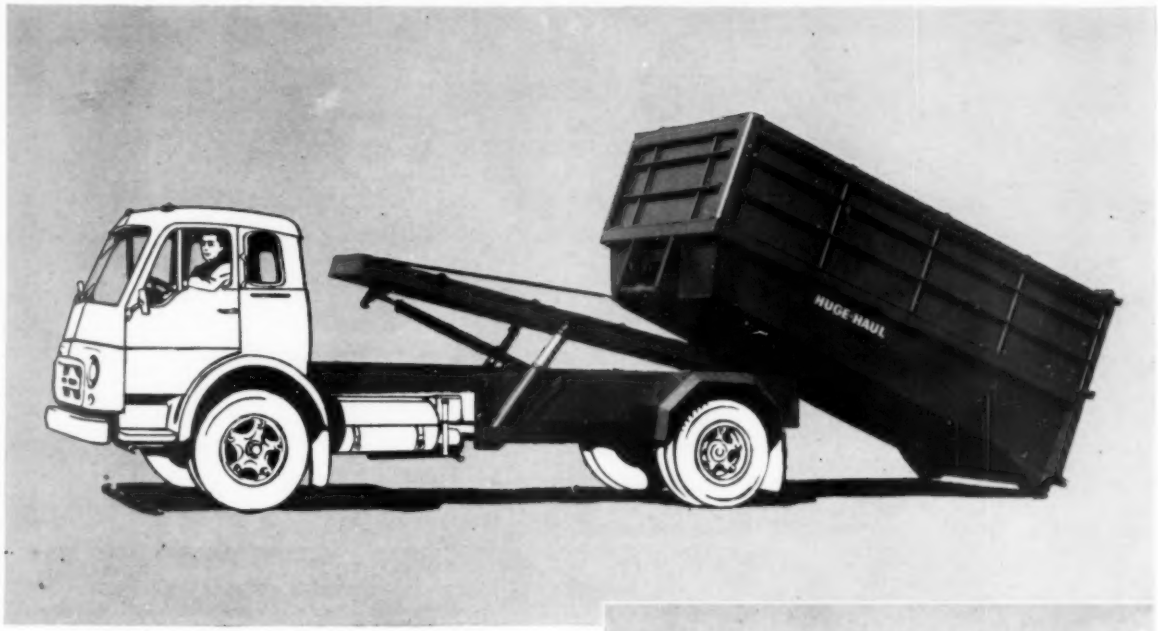

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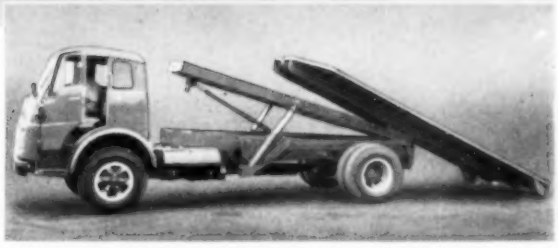

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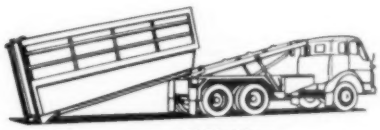
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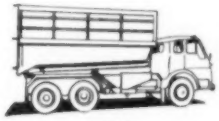
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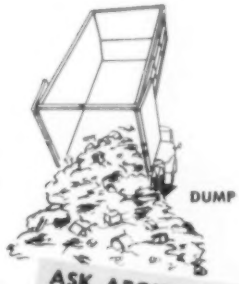

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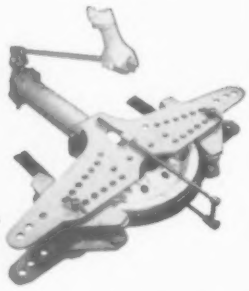

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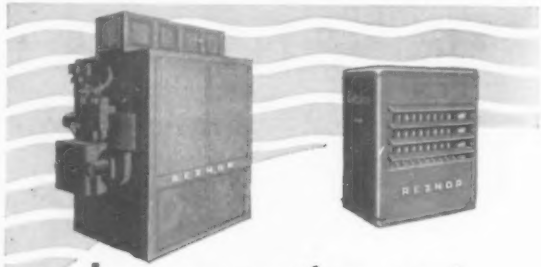

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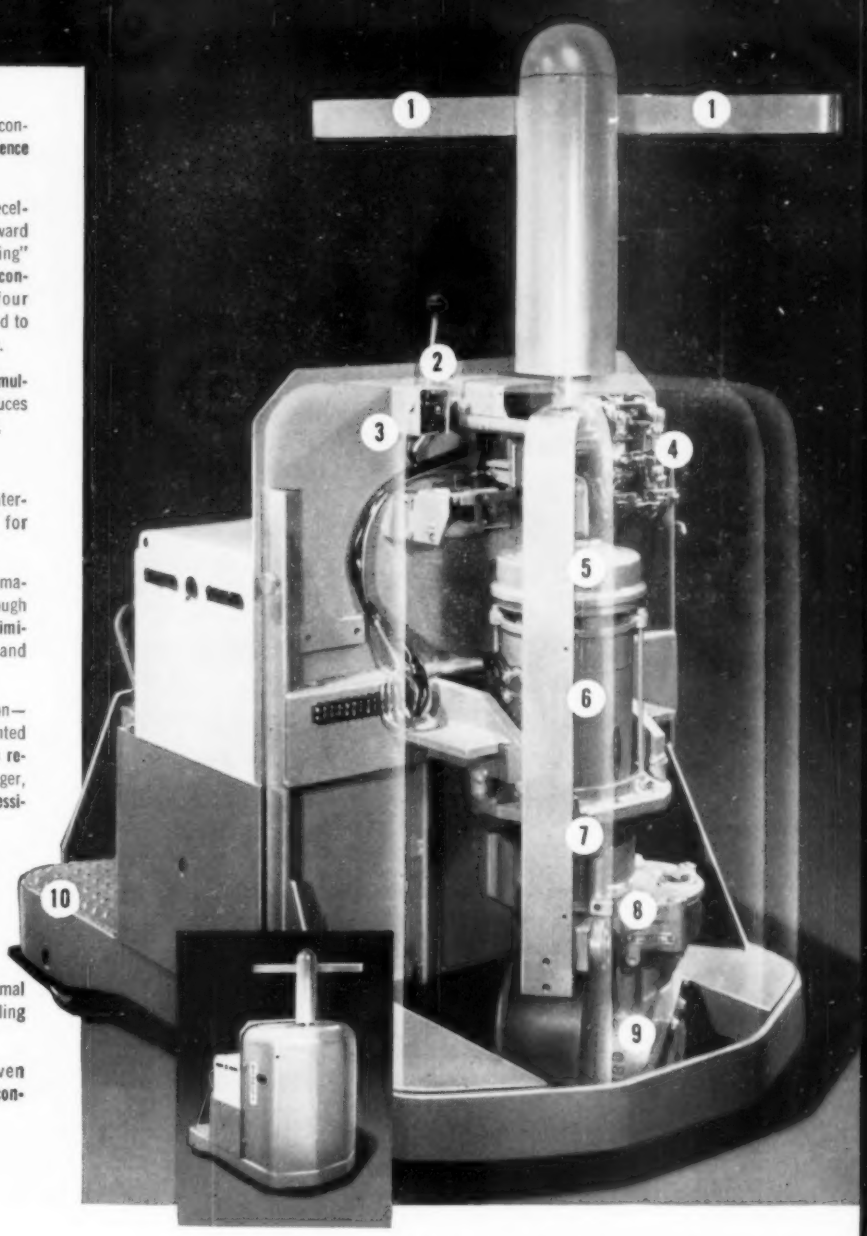

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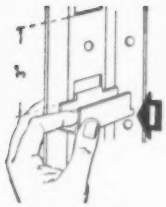

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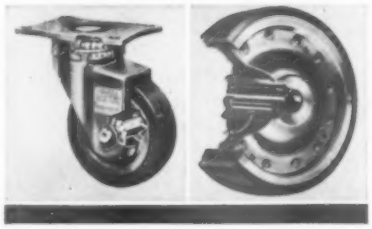

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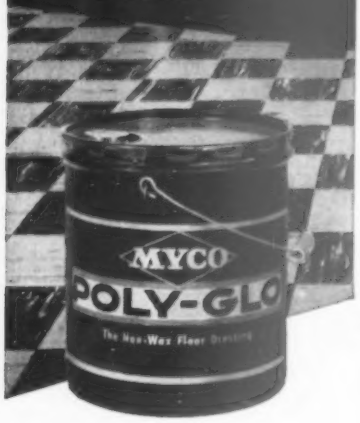

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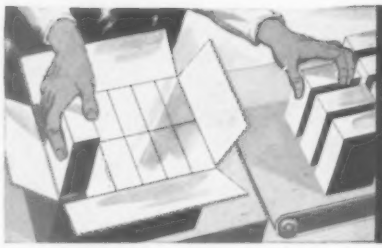

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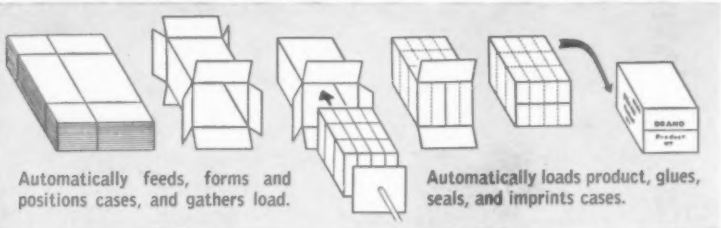
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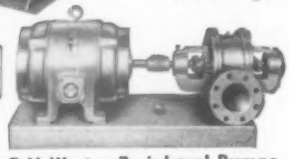

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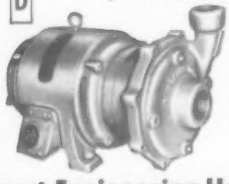

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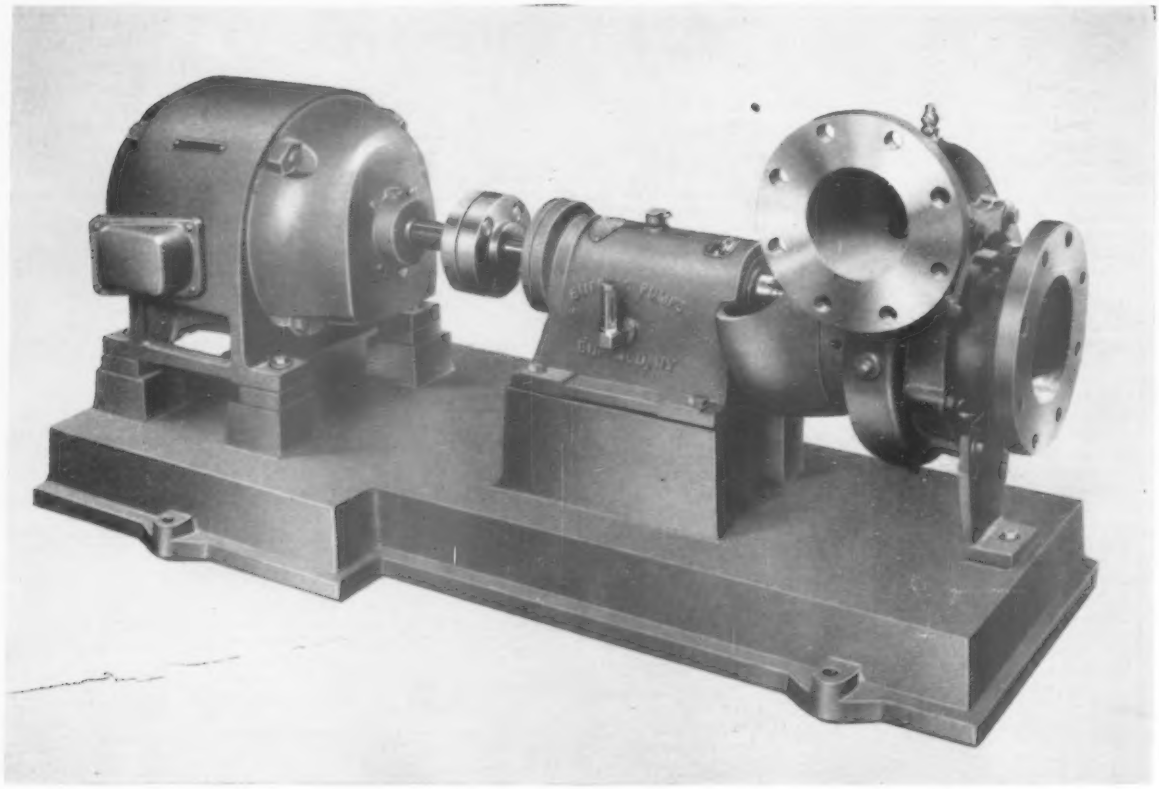

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Catalogs in This Issue

To help you, here is a list of catalogs described in this issue. To obtain, circle key numbers on either postcard.

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2—Motor Application Guide
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60—TV Cameras, Equipment
61—Interchangeable Typewriter Type
62—Data Processing Systems
63—Electronic Computer
64—Marking Machines

IF YOU WANT COMPLETE SAFETY IN YOUR SAFETY SWITCHES— REMEMBER THE "V" FOR VISIBLE BLADES!

The men who pull the switches will tell you what can happen when a switch, *believed* to be open—*isn't*. A lot of things can happen—and every one of them is bad. Personnel safety is in jeopardy. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on Visible Blade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages?

NEW! TYPE LD SWITCH

Quality Features at Low Price

- ✓ Spring-operated quick-make, quick-break
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- ✓ Positive pressure (spring loaded) fuse clips
- ✓ Full horsepower ratings

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

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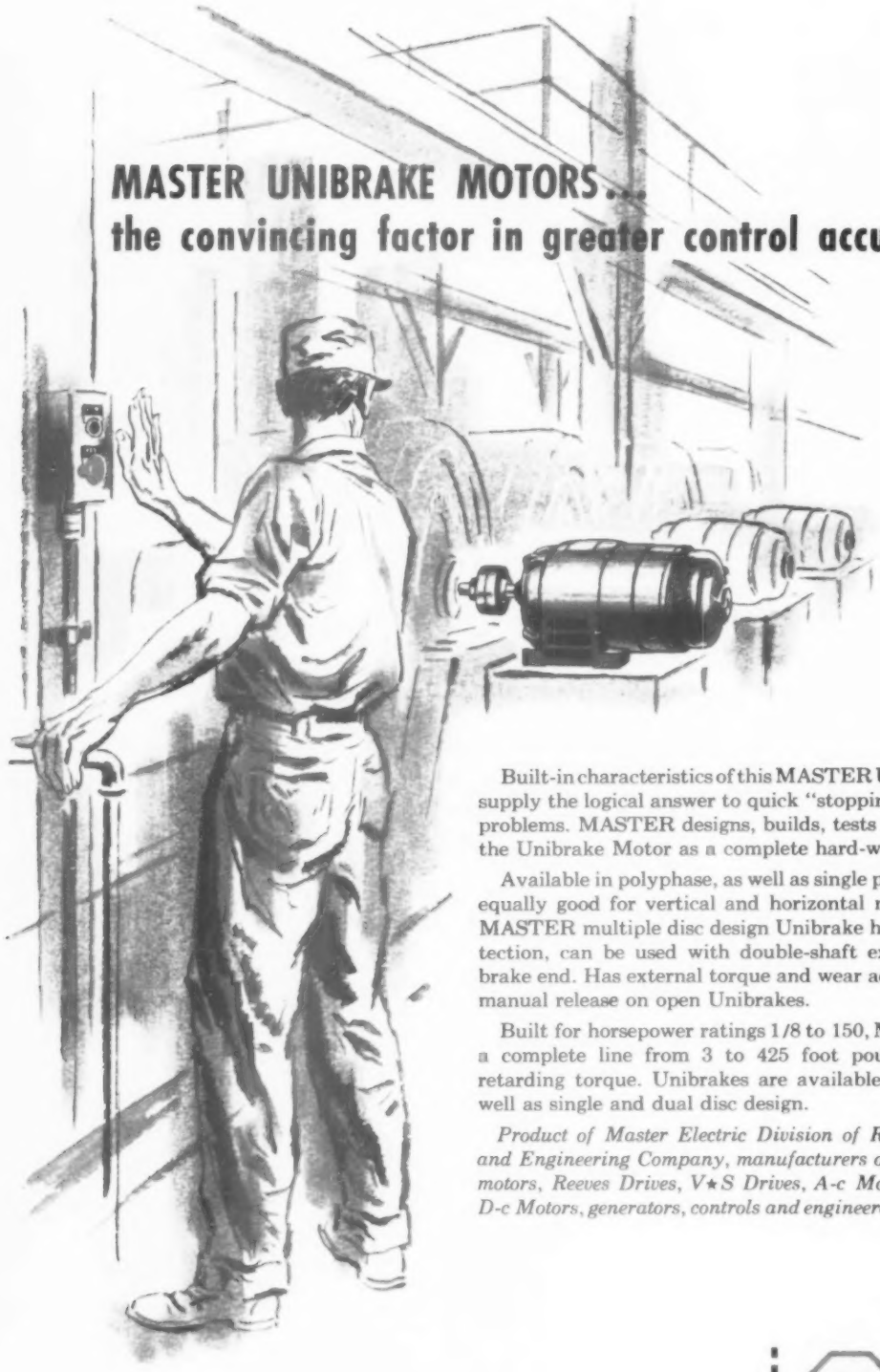

Built-in characteristics of this MASTER Unibrake Motor supply the logical answer to quick "stopping and holding" problems. MASTER designs, builds, tests and guarantees the Unibrake Motor as a complete hard-working *unit*.

Available in polyphase, as well as single phase and d-c.—equally good for vertical and horizontal mounting—this MASTER multiple disc design Unibrake has fail-safe protection, can be used with double-shaft extension at the brake end. Has external torque and wear adjustment, plus manual release on open Unibrakes.

Built for horsepower ratings 1/8 to 150, MASTER offers a complete line from 3 to 425 foot pounds maximum retarding torque. Unibrakes are available in multiple as well as single and dual disc design.

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